

VENICE 2024

25-27 NOVEMBER 2024
HOTEL MONACO & GRAN CANAL
VENICE, ITALY

**10TH INTERNATIONAL
SYMPOSIUM ON ENERGY
FROM BIOMASS AND WASTE**

**SYMPOSIUM GUIDEBOOK / PROGRAMME,
USEFUL INFO, SOCIAL EVENTS, NOTEBOOK**

VENICE2024

10TH INTERNATIONAL SYMPOSIUM ON ENERGY FROM BIOMASS AND WASTE

25-25 NOVEMBER 2024 | HOTEL MONACO & GRAND CANAL, VENICE, ITALY

ORGANISED BY:



WITH THE SCIENTIFIC INVOLVEMENT OF:

Technical University of Denmark (DK)
Hamburg University of Technology (DE)
University of Kyoto (JP)
University of Padua (IT)
The University of Queensland (AU)
University of Rostock (DE)
Sultan Qaboos University (OM)
Tongji University (CN)
Zhejiang University (CN)

PROMOTED BY:

US-EPA - United States Environmental Protection Agency (US)
Bioenergy Europe
CEWEP - Confederation of European Waste-to-Energy Plants
ESWET - European Suppliers of Waste-to-Energy Technology
EWABA - European Waste-based & Advanced Biofuels Association
KAWET - Korea Association of Waste to Energy Technology (KR)
Global Waste-to-Energy Research and Technology Council (WtERT®)
World Bioenergy Association
National Engineering Research Center for Clean Utilization Technology and Equipment of Solid Waste Energy of China (CN)
GITISA - Italian Group of Environmental and Sanitary Engineering (IT)
AIAT - Italian Association of Environmental and Planning Engineers (IT)
Tavolo di Roma - a think tank on waste management strategies (IT)

UNDER THE PATRONAGE OF:



PARTNER JOURNAL:



Multidisciplinary Journal for
Circular Economy and Sustainable
Management of Residues

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PRESENTATION

PRESENTAZIONE

The production of energy from alternative sources and its impact on climate change are among the main strategic tools implicated in the sustainable development of society, particularly in this period where geopolitics and dependence on energy have become such an important issue.

Numerous types of biomass and wastes contribute towards the production of energy and reduction in the use of fossil fuels by means of biological, chemical and thermal processes. Existing biomass and waste to energy technologies are currently undergoing rapid development. Despite growing interest in use of these technologies however, implementation in many countries remains limited.

The aim of the Venice Symposium is to focus on advances made in the application of technologies for energy recovery from biomass and waste and to encourage discussion in these fields.

The Symposium is organised by IWWG–International Waste Working Group with the scientific involvement of the Universities of Hamburg (DE), Kyoto (JP), Padova (IT), Queensland (AU), Rostock (DE), Tongji (CN), Zhejiang (CN) and Sultan Qaboos University (OM).

The event is held under the patronage of the Italian Ministry of Environment and Energy Security, Veneto Region, ENEA–Italian National Agency for New Technologies, Energy and Sustainable Economic Development, and ISPRA - The Italian Institute for Environmental Protection and Research.

Venice 2024 is held under the aegis of Tavolo di Roma, - a think tank on waste management strategies (IT).

La produzione di energia da fonti alternative e il conseguente impatto che questo può avere sui cambiamenti climatici sono oggi tra i principali strumenti strategici implicati nello sviluppo sostenibile della nostra società. Numerose tipologie di biomasse e rifiuti contribuiscono infatti, a seguito di processi biologici, chimici e termici, alla produzione di energia e alla riduzione dell'utilizzo di combustibili fossili. Se però da un lato l'interesse della comunità scientifica al riguardo è in continua crescita e le tecnologie esistenti per la generazione di energia da biomasse e rifiuti registrano un rapido sviluppo, dall'altro in molti paesi la loro implementazione rimane ancora limitata.

Lo scopo del Simposio Venice è focalizzare l'attenzione sulle innovazioni e tecnologie per il recupero di energia da rifiuti e biomasse, evidenziarne i progressi più significativi e promuovere la discussione su argomenti quali l'affidabilità dei processi, la loro applicazione su larga scala, i potenziali impatti ambientali ed effetti sulla salute, l'informazione ed il consenso dei cittadini.

L'evento è organizzato dall'IWWG - International Waste Working Group, con il patrocinio del Ministero dell'Ambiente e della Sicurezza Energetica e della Regione Veneto, di ENEA, ISPRA e con il supporto scientifico delle Università di Amburgo, Kyoto, Padova, Queensland, Rostock, Sultan Qaboos, Tongji e Zhejiang. Il Venice 2024 si tiene sotto l'egida del Tavolo di Roma.

SCIENTIFIC COMMITTEES

COMITATI SCIENTIFICI

SYMPOSIUM CHAIRS / PRESIDENTI DEL SIMPOSIO



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University of Padova
(IT)



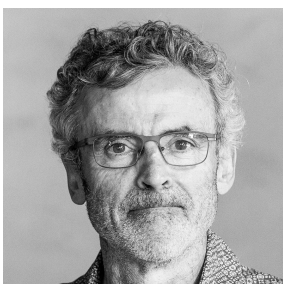
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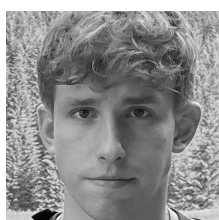
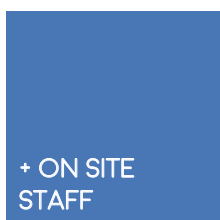
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SYMPOSIUM STRUCTURE

STRUTTURA SIMPOSIO

The scientific programme of Venice 2024 is structured in 3 parallel tracks. The presentations are organised in Oral sessions, Workshops and Poster sessions for a total of 31 sessions during which about 130 presentations will be delivered.

Oral sessions last 60 min and include 5 presentations and a Discussion. Workshops are focused on controversial issues in Waste to Energy; they include few introductory short papers for seeding the debate among participants. Posters will be available digitally, allowing download of the individual posters and discussion with the Authors through the symposium app

In addition to these traditional sessions, the Symposium includes four plenary Focus Sessions dedicated to specific themes of high public interest. A moderator, after a state of the art presentation and statement made by 2-3 experts in the field, will guide the discussion among the experts and the audience. The format and the session settings are similar to a "talk show".

Il programma scientifico del VENICE 2024 comprende circa 130 presentazioni distribuite in 3 sessioni parallele.

Le presentazioni sono state organizzate in sessioni orali, workshop e poster. Le sessioni orali avranno una durata di 60 minuti, con 5 presentazioni seguite da un momento di discussione con il pubblico. I workshop saranno incentrati su temi controversi del Waste to Energy e includeranno brevi presentazioni introduttive per aprire il dibattito tra i partecipanti. La sessione poster sarà accessibile digitalmente, consentendo la visualizzazione di presentazioni, il download dei singoli poster. E' possibile contattare gli Autori attraverso la App.

Oltre alle sessioni tradizionali, il Simposio prevede quattro momenti di confronto in seduta plenaria: le Focus Sessions, che si terranno tutti i giorni, una al mattino e una al pomeriggio, dedicate a temi specifici di alto interesse pubblico. Un moderatore, dopo una presentazione sullo stato dell'arte e un'introduzione da 2-3 esperti del settore, guiderà la discussione tra gli esperti e il pubblico. Il formato e le impostazioni della sessione saranno simili a un "talk show".

CONFERENCE ROOMS | SALE CONGRESSUALI

Session A:	Salone del Ridotto - first floor
Session B:	Corte Room - first floor
Session C:	Vallaresso Room - first floor
Digital Poster:	Oppio Room - first floor
Coffee break:	Campiello Hall - ground floor

INSTRUCTIONS

ISTRUZIONI

INSTRUCTIONS FOR SESSION CHAIRS & SPEAKERS / ISTRUZIONI PER PRESIDENTI DI SESSIONE E RELATORI

Instructions for Chairs of Sessions

On arrival at the Symposium venue Chairs of oral sessions and workshops are kindly requested to contact the Speakers' Desk where curricula vitae of speakers will be provided and any last-minute changes in the programme of the session to be chaired will be notified.

Fifteen minutes prior to the start of the sessions, Chairs should report to the conference room where the session will take place, to meet the speakers.

Chairs are furthermore requested to ensure that all speakers remain seated at the table throughout the entire session and that the timetable is strictly adhered to. This aspect is of extreme importance in order to allow delegates to schedule their attendance in the parallel sessions.

Istruzioni per i Presidenti di sessione

I Presidenti delle sessioni orali e dei workshop sono gentilmente pregati di avvicinarsi allo Speakers Desk al proprio arrivo presso la sede del Simposio affinché vengano forniti loro i curricula vitae dei relatori e vengano comunicate eventuali modifiche al programma della sessione che dovranno presiedere.

Quindici minuti prima dell'inizio delle rispettive sessioni, i Presidenti si presenteranno presso la sala dove si svolgerà la sessione per prendere contatto con i relatori.

I Presidenti di sessione sono inoltre pregati di adoperarsi affinché nessuno dei relatori abbandoni la sala prima della conclusione della sessione e venga rispettata la tempistica prevista. Quest'ultimo aspetto è di particolare importanza al fine di consentire ai partecipanti di seguire le relazioni di loro interesse in diverse sessioni parallele.

Information for Speakers

Speakers should contact the Chair 15 minutes prior to the start of the session in which their paper is to be presented. The Chair will be available in the conference room where the session is to take place. Speakers should be present at the conference table from the beginning of the session and remain for the entire duration. During the presentation commercial advertising should be avoided. Mention of affiliations or company name should be very discreet.

A member of our staff is available at the Speakers' Desk for all requirements. Speakers who have not sent a copy of their PowerPoint presentation to the Organising Secretariat are kindly requested to contact the Speakers' Desk in a timely manner, at the latest within the session prior to the one in which their own presentation is scheduled.

If your allotted time runs out, do not under any circumstances hurry to finish the entire presentation but go straight to the conclusions. To this regard, it may be of use to prepare a slide illustrating the conclusions in a summarized version.

INSTRUCTIONS

ISTRUZIONI

Istruzioni per gli Autori

I relatori dovranno contattare il Presidente della sessione durante la quale presenteranno la propria relazione almeno 15 minuti prima dell'inizio della stessa nella sala conferenze di riferimento. Gli autori dovranno essere presenti al tavolo della conferenza dall'inizio della sessione e rimanervi per tutta la durata della stessa. Nella presentazione va assolutamente evitata qualsiasi forma di pubblicità. Il riferimento a enti o ditte di appartenenza deve essere molto discreto. Al Banco Relatori sarà sempre presente un incaricato dell'organizzazione per fornire eventuale assistenza. Non sarà possibile utilizzare il computer del banco relatori per preparare le relazioni, ma solo per apportare piccole modifiche e per un controllo finale.

I relatori che non avessero inviato una copia della loro presentazione PowerPoint alla Segreteria Organizzativa prima del Simposio sono cortesemente pregati di recarsi al Banco Relatori non oltre la sessione precedente a quella in cui devono presentare la propria relazione (se si tratta di una sessione in programma per la mattina, il termine ultimo per contattare il Banco Relatori sarà la sera prima).

I relatori dovranno assicurarsi che la presentazione sia consegnata allo staff di riferimento secondo le tempistiche indicate.

Durante la presentazione, nel caso stia per terminare il tempo a disposizione, si prega di non accelerare per esporre il resto della relazione ma di passare direttamente alle conclusioni. A tal proposito, potrebbe rivelarsi utile preparare una slide che sintetizzi le conclusioni.

USEFUL INFORMATION

INFORMAZIONI UTILI

WHAT'S INCLUDED IN YOUR REGISTRATION / CHE COSA INCLUSO NELLA VOSTRA REGISTRAZIONE

- Access to all Symposium sessions and workshops
- Coffee breaks
- Conference Proceedings
- Conference material
- Symposium App
- Wine testing and welcome cocktail
- 50% discount on the cost of the Gala Dinner & Masquerade Party
- Wi-Fi Internet access

- *Accesso a tutte le sessioni del Simposio*
- *Coffee break*
- *Atti del Simposio*
- *Materiale congressuale*
- *App del Simposio*
- *Degustazione vini e cocktail di benvenuto*
- *50% di sconto sul costo della Cena di Gala e Festa in maschera*
- *Wi-Fi Internet*

REGISTRATION / REGISTRAZIONI

The Registration Desk will be open in the Conference Centre with the following schedule:

- Monday 25th November: 8:30 - 9:00, 10:30 - 13:00, 15:00 - 18:30
- Tuesday 26th November: 8:30 - 13:00, 15:00 - 18:30
- Wednesday 27th November: 8:30 - 13:00, 15:00 - 18:30

Il banco segreteria per la registrazione al Simposio e per tutte le altre informazioni sarà aperto presso il Centro Congressi ai seguenti orari:

- *Lunedì 25 Novembre: 8:30 - 9:00, 10:30 - 13:00, 15:00 - 18:30*
- *Martedì 26 Novembre: 8:30 - 13:00, 15:00 - 18:30*
- *Mercoledì 27 Novembre: 8:30 - 13:00, 15:00 - 18:30*

LUNCH OPTIONS / POSSIBILITA' PER IL PRANZO

It will be possible to have lunch at the restaurant of the Hotel Monaco and Grand Canal, at the special price of €35,00 which includes a main course (first or second one), coffee and water. Alternatively, it is possible to eat à la carte with a 20% discount on the restaurant prices. Should you be interested, you can contact the Hotel reception to book your place upon your arrival or at least a few hours before lunch.

Sarà possibile pranzare presso il ristorante dell'Hotel Monaco e Grand Canal, al prezzo speciale di € 35,00 che comprende una portata principale (primo o secondo), un dessert, caffè e acqua. In alternativa, è possibile consumare alla carta con uno sconto del 10% sui prezzi del ristorante. Per prenotare si prega di contattare la reception dell'Hotel al vostro arrivo o al più tardi qualche ora prima del pranzo.

Lunch menù / Menù per i pranzi

Lunedì 25 Novembre

- Filetto di salmone al forno in crosta d'olive taggiasche
- Riso pilaf e verdure croccanti
- Flute di Vino e Acqua
- Caffè

Martedì 26 Novembre

- Filetto di manzo con capperi di Pantelleria e pepe nero, su letto di schiacciata di patate e verdure croccanti
- Flute di Vino e Acqua
- Caffè

Mercoledì 27 Novembre

- Filetto di branzino al forno con julienne di verdure e patata dauphinoise
- Flute di Vino e Acqua
- Caffè

SOCIAL PROGRAMME

EVENTI SOCIALI SERALI

Social events have always played a crucial role in the success of our Symposia, representing the chance for all delegates to enjoy the company of colleagues and friends and relax after a full day of conference sessions. VENICE Symposium will be the perfect occasion to meet again after a long time, create new collaborations and friendships, share ideas and have a good time together!

For further details please check the bulletin board in the congress foyer or contact the Organising Secretariat at the registration desk!

Come tutti sappiamo, negli ultimi tempi abbiamo dovuto ridurre al minimo le interazioni sociali e le attività di gruppo. Il VENICE 2024 sarà l'occasione perfetta per ritrovarsi dopo tanto tempo, creare nuove collaborazioni e amicizie, condividere idee e divertirsi insieme!

Per ulteriori dettagli sui singoli eventi serali contattare la Segreteria Organizzativa al banco registrazioni o consultare la bacheca nel centro congressi.



MONDAY | 25 NOVEMBER | H. 19:00

WINE TASTING & WELCOME COCKTAIL

Get the Symposium off to a great start and meet old and new friends in the beautiful setting of Hotel Monaco. A prestigious selection of Italian wines will be served during the evening.

Free event for symposium delegates. Page 26



TUESDAY | 26 NOVEMBER | H. 19:00

BACARO TOUR

An alternative & funny way to discover the city by night, around the *sestrieri* of Venice, to enjoy a few glasses of wine with friends. Grouped in 6/8 people and guided by local friends and members of our staff, we will discover the most authentic *bàcari* of the city. **Book your place!** Page 38



WEDNESDAY | 27 NOVEMBER | H. 20:00

GALA DINNER & MASQUERADE PARTY

DRESS CODE: Black or Red & Venetian Mask!
The event will consist of a seated dinner, a party in typical Venetian style, music and dance entertainment. **Reservation is mandatory.** Page 50

DAY 1 MONDAY
NOVEMBER 25

MONDAY NOVEMBER 25

MORNING

OPENING SESSION / SALONE DEL RIDOTTO / 9:00-10:30

Chair / Presidente: Raffaello Cossu (IT)

WELCOME ADDRESSES / SALUTI DI BENVENUTO

- Raffaello COSSU, *University of Padova (IT)*
- Thomas ASTRUP, *Technical University of Denmark (DK)*
- Dezhen CHEN, *Tongji University (CN)*
- William CLARKE, *University of Queensland (AU)*
- Michael NELLES, *University of Rostock (DE)*
- Rainer STEGMANN *Hamburg University of Technology (DE)*

COFFEE BREAK / 10:30-11:00

FOCUS SESSION I

SALONE DEL RIDOTTO / 11:00-12:30

ARTIFICIAL INTELLIGENCE AND WASTE TO ENERGY

Moderator:

Prof. Rainer Stegmann, *Hamburg University of Technology (DE)*

Artificial Intelligence (AI) conquers all sectors of our private and business life. Important questions are:

- how do we deal with this situation
- how far can we control AI or will it control us.

Also, in the waste management sector AI is already used, in the operation of plants but also in education. What can we do to avoid misuse and unconditional trust. Does AI make mistakes that we might not realize on first sight?

In this interactive Focus Session we will try to find out how knowledgeable is AI in our field. The idea is to ask "Prof. Arti Intel" questions from the area of Waste to Energy. The answers we receive will be discussed by the invited expert group on stage and the audience. Questions will be asked by the moderator, the experts in the round and the audience. Such questions shall become more and more difficult in order to find out the limits of Prof. Arti Intel's knowledge. This is an experiment with an open outcome and we all are very excited to see how this session will go.

LUNCH BREAK / 12:30-15:00

Rainer Stegmann was Professor from 1982 to 1990 at the Institute of Environmental Protection and from 1991 to 2008 Head of the Institute of Waste Management at the Technical University of Hamburg, Germany. He retired in March 2008. He is one of the prominent researchers in the field of waste management and provided in particular fundamental scientific contributions on sustainable landfilling, anaerobic digestion, biogas generation and control, treatment of contaminated soil. He co-ordinated several international and national research projects, and was member of the environmental advisory board of Shanks, England. From 2009 until 2011 he was director of the R3C Research Center at the Nanyang University of Technology, Singapore, for which he is now scientific advisor. He is co-organiser of several national and international conferences and has published more than 300 scientific papers and several books. Since 2008 he has been the chairman of IWWG (International Waste Working Group).



Prof. Rainer Stegmann
Hamburg University of
Technology (DE)

Contact:
stegmann@tuhh.de

MONDAY NOVEMBER 25

AFTERNOON

SESSION A1 / SALONE DEL RIDOTTO / 15:00-16:00

ENVIRONMENTAL AND PLANNING ISSUES

Chair / Presidente: S. Consonni (IT)

L. Acampora, G. Costa, S. Malvezzi, B. Papa, C. Mensi (IT)

Evaluation of emission factors for waste-to-energy plants based on experimental measurements and plant specific data

H. Gohar, G. Beggio, M.C. Lavagnolo (IT)

Air-polluting emissions from pyrolysis of biomass and waste

Y. Yoshida, Y. Hirai, J. Yano (JP)

Optimal location of incineration facilities considering multiple periods: a case study of Kyoto City

K. Kawai, H. Hirai, K. Ishiketa, T. Kobayashi, H. Kuramochi, M. Osako (JP)

Biomethanation of biomass waste and its demand for the products by province in Japan

SESSION B1 / CORTE ROOM / 15:00-16:00

BIOREFINERY

Chair / Presidente:

S. Ajdari, A.S. Salim (SE)

Transforming waste into value: sustainable production of platform chemicals in Sweden

E. Sventzouri, K. Pispas, G. Manthos, M. Kornaros (GR)

Selecting and cultivating photosynthetic microorganisms in anaerobic digestion effluent from agricultural waste for bioplastic production

F. Khodaparastan, S. Ashok, E. De-Oliveira, C. Switzer, G.P. Grant, M. Zaroni, J. Bowen, T. Rashwan (GB)

Exploring biomass valorisation in applied smouldering systems

A.P.C. Ribeiro, A.O. Figueiras, L.M.D.R.S. Martins (PT)

Extraction of Chitin from *Tenebrio Molitor*

COFFEE BREAK / 16:00-16:30

SESSION C1 / VALLARESSO ROOM / 15:00-16:00

WORKSHOP:

GENERATION OF ENERGY FROM MICROBIAL FUEL CELLS

Chair / Presidente: M.Á. López Zavala (MX)

F. Borja-Maldonado, M. Á. López Zavala (MX)

Improving the efficiency of medium-scale dual-chamber microbial fuel cells by using innovative electrode materials and appropriate selection of external resistance

F. Borja-Maldonado, M. Á. López Zavala (MX)

Contribution of electrode and membrane materials, configurations, electron transfer mechanisms, and cost of components on the current and future development of microbial fuel cells

COFFEE BREAK / 16:00-16:30

MONDAY NOVEMBER 25

AFTERNOON

FOCUS SESSION II

SALONE DEL RIDOTTO | 16:30-18:00

BIOGENIC WASTE INCINERATION PLANTS: NONSENSE OR PART OF SUSTAINABLE WASTE TREATMENT?

Moderator:

Prof. Michael Nelles *University of Rostock (DE)*

Panelists:

to be confirmed

Waste incineration is a central component of sustainable waste management concepts and is intended to dispose of non-recyclable waste in an environmentally friendly manner. In practice, also biogenic waste such as waste wood, paper, cardboard, kitchen and garden waste is treated in WtE plants. For example, the biogenic share in the input of waste incineration plants in Germany is approx. 50% and also around 50% of the CO₂-emission are "green".

This raises the fundamental question of whether and when the use of biogenic waste in WtE plants is ecologically sensible, technically feasible and economically viable. Since the practice of incinerating biogenic waste in WtE plants varies greatly internationally and the current situation will be discussed with experts from Europe, Asia and America.

The following questions will then be discussed with the experts:

- Which biogenic waste should be used in WtE plants from an ecological point of view and which should not?
- Do we need different solutions in the countries?
- Which incineration technologies are suitable for the incineration of biogenic waste?
- How should biobased emissions be assessed (green CO₂, CCS, CCU, negative emissions)?

Michael Nelles is full professor of Waste Management and Material Flow at the faculty of Agricultural and Environmental Science, University of Rostock, Germany.

He is the Scientific Director of the German Biomass Research Centre (DBFZ) in Leipzig and Member of Scientific Advisory Boards for different national and international conferences and journals.

He is author of over 300 articles, chapters in books and journals. His research activity is oriented to: fundamental and applied aspects of waste management, with focus on technological, environmental and economic aspects to mechanical, biological and thermal treatment systems of waste and biomass in different recycling and recovery routes.



Prof. Michael Nelles
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DAY 2 TUESDAY
NOVEMBER 26

TUESDAY NOVEMBER 26

MORNING

SESSION A2 / SALONE DEL RIDOTTO / 9:00-10:00

BIOMASS AND WASTE DERIVED FUEL

Chair / Presidente: F. Viganò (IT)

B.N. López Niño, M. Buryi, A. Mašlani (CZ)

Solid product as possible elemental pollutants reservoir after Refused Derived Fuel (RDF) thermal plasma treatment

H. Sherif, M. Salah, M.S. Sadek, R.M. Sayed, S. Saeed (EG)

Refused derived fuel (RDF) bio-drying by using composting turning machine in a full-scale Egyptian facilities

H. Sherif, M.S. Sadek, R.M. Sayed, S. Saeed (EG)

Biomass Derived Fuel (BDF) production in Egypt: current status and future prospects

SESSION B2 / CORTE ROOM / 9:00-10:00

AEROBIC DIGESTION

Chair / Presidente: W. Clarke (AU)

K.O.F. Al-Twal, G. Beggio, V. Grossule, A. Sandon, M. Schiavon, M.C. Lavagnolo (IT)

Characterization of feedstocks for the optimization of energy recovery from composting: a review for the TEAPOTS project

H. Jalalipour, S. Nakhaei, G. Morschek, M. Nelles (DE)

Comparative analysis of biogas and compost plants for source-separated biowaste treatment

S. Stegenta-Dabrowska, J. Rosik, K. Swiechowski (PL)

Optimizing dairy sewage sludge and green waste composting: laboratory-scale study

W. Chen, Y. He, L. Xie (CN)

Achieving rapid stabilisation of aerobic composting by the construction of oxygen transport channels

R. Burch, D.K. Cha, M.J. Chajes (US)

On-site aerobic bio-digester for resource recovery from food waste

COFFEE BREAK / 10:00-10:30

SESSION C2 | VALLARESSO ROOM | 9:00-10:00

SEWAGE SLUDGE TO ENERGY

Chair / Presidente: M. Takaoka (JP)

L. Ekpeni, K. Benyounis, J. Stokes (IE)

Sludge effectiveness in the disruptive process of a biomass substrate for improved energy yield

B.-K. Ahn, Y.-M. Yun (KR)

Impact of primary and secondary pretreatment on anaerobic digestion of waste activated sludge

E. Fersini, A. Giuliano, F. Todaro, A. Violante, C. Wieth, M. Notarnicola (IT)

Evaluation of sewage sludge treatment by pilot pyrolysis plant and laboratory analysis

K. Swiechowski, K. Zasanska, J. Rosik, M. Bednik, S. Stegenta-Dabrowska (PL)

Pyrolysis of dairy sewage sludge, energy and environmental aspects of bio-char

D. Panepinto, B. Ruffino, S. Frisario, M. Urciuolo, A. de Folly d'Auris, G. Premoli, M. Zanetti (IT)

Analysis of the PFAS treatment, regulation and experimental investigation

COFFEE BREAK | 10:00-10:30

TUESDAY NOVEMBER 26

MORNING

SESSION A3 / SALONE DEL RIDOTTO / 10:30-11:30

COMBUSTION PROCESS

Chair / Presidente:

S. Park, H. Kim, H. Jo, D. Shin, J. Lee, J. Son, Y. Yun, C. Ryu (KR)

Forecasting operational performance of a waste incinerator using AI-based models

A. Ise, C. Nishihara, Y. Onuki, G. Matsumoto, S. Motoyama, S. Shigemasa (JP)
Multiple AI models for improving combustion stability of waste-to-energy plants

S. Ozgen, A. Wu, F. Ruiz (IT)

Modelling approaches for model-based predictive control of acid gases in waste-to-energy plants

T. Shinohara, H. Harada, K. Shiota, M. Takaoka (JP)

Evaluation of corrosion of superheater tubes under CO₂-rich environment in waste to energy plant

SESSION B3 / CORTE ROOM / 10:30-11:30

BIOFUELS

Chair / Presidente: D. Panepinto (IT)

B.A. Simmons (US)

Flying the future: advances in sustainable aviation fuels at the Joint BioEnergy Institute (JBEI)

H. Tang, D. Chen, Y. Feng (CN)

Production of iso-alkanes in aviation fuel from catalytic pyrolysis of low-density polyethylene

L. Lombard, A. Poletti, R. Pomi, A. Rossi, T. Zonfa, M. Wilk (IT)

Combining dark fermentation, hydrothermal carbonization and anaerobic digestion for producing biofuels

SESSION C3 / VALLARESSO ROOM / 10:30-11:30

WORKSHOP: ADVANCES IN BIOWASTE FERMENTATION

Chairs / Presidenti: *U. Theilen, H. Weigand, F. Brück (DE)*

This workshop will showcase significant advancements in the field of biowaste fermentation, using the RegBioFerm project as a starting point to explore broader applications.

The focus will be on scaling innovative anaerobic digestion processes to large-scale, multi-input demonstration plants (TRL 8) and implementing highly efficient cascaded energetic and material valorization of biogenic wastes.

Additionally, the session will delve into how these technologies can be integrated into rural regional value networks to foster a sustainable circular bio-economy, thereby enhancing the efficiency of renewable energy production and reducing dependency on fossil fuels.

Agenda:

- Opening Remarks and Introduction
- *Felix Brück (DE)*
Experimental research in biowaste processing
- *Andrzej Białowiec, Marvin Valentin (PL)*
Modeling inoculum and substrate dynamics in continuous flow anaerobic reactors
- *Hannah-Sophie Tscherney, Holger Rohn (DE)*
Life Cycle Assessment of biowaste fermentation to ensure sustainability
- Discussion and Q&A
- Closing Remarks

TUESDAY NOVEMBER 26

MORNING

SESSION A4 / SALONE DEL RIDOTTO / 11:45-12:45

WASTE PYROLYSIS

Chair / Presidente: M. Takaoka (JP)

W. Zhao, H. Harada, S. Oleszek, K. Shiota, Y. Sakurai, K. Oshita, M. Takaoka (JP)
Study of pyrolysis characteristics of actual refuse to establish a pyrolysis gasification process for Municipal solid waste (MSW)

P. Ma, J. Yan, Z. Ma, A. Cao, S. Ling, Y. Zhang (CN)
Study on catalytic pyrolysis characteristics of waste plastics in medical waste

J. Zhang, Y. Guo, Z. Zhang, Z. Zhang, T. Zhang (CN)
Sulfur and Chlorine releasing and migration during pyrolysis of anaerobic digestate derived from kitchen waste

A. Zhang, Y. Qiu, Y. Feng (CN)
The effect of pre-pyrolysis on structure and properties of hard carbon for sodium battery

E. Sygula, J. Lyczko, A. Bialowiec (PL)
Furfural emission from biochar derived from lignin, cellulose, and hemicellulose: industrial benefits and environmental risks

SESSION B4 / CORTE ROOM / 11:45-12:45

LIFECYCLE THINKING AND ASSESSMENT

Chair / Presidente: T. Astrup (DK)

A. Masi, G. Costa, L. Lombardi (IT)
Comparative LCA of carbonation-based treatments for valorising Alkaline residues and storing CO₂ within a biorefinery process

F. Gievers, A. Loewen, M. Nelles (DE)
Energy or material use of biochar and hydrochar produced from sewage sludge? A life cycle assessment approach

H.-S. Tscherney, H. Rohn (DE)
Towards the life cycle assessment of a rural value network centered on the energetic and material utilization of biowaste

L. Lombardi, G. Arcese, G.C. Elmo, B. Mendelka, S. Sobek, K. Pikon, A. Kuzior, K. Moustakas, M. Kyriazi, M. Horttanainen, K. Grönman, M. Abdulkareem, M. Khan, A. Woszczek (IT)
LIFE-C: promoting life cycle thinking in higher education

LUNCH BREAK / 12:45-15:00

SESSION C4 | VALLARESSO ROOM | 11:45-12:45

WORKSHOP: PRODUCTION AND RECYCLING OF WASTE FROM RENEWABLE ENERGY PRODUCTION

Chair / Presidente:

D. Trento, F. Faleschini, V. Revilla-Cuesta, V. Ortega-López (IT)

Raw-crushed wind-turbine blade as an effective addition to enhance recycled concrete properties

F. Pagnanelli, P. Altimari, P.G. Schiavi, E. Moscardini, L. Toro (IT)

Recycling of photovoltaic panels: process development and technology transfer during the last ten years

A. Becci, A. Amato, M. D'Arcangelo, F. Beolchini (IT)

Flexible hydrometallurgical process for metal recovery from new generation photovoltaic panels

LUNCH BREAK | 12:45-15:00

TUESDAY NOVEMBER 26

AFTERNOON

SESSION A5 / SALONE DEL RIDOTTO / 15:00-16:00

GASIFICATION

Chair / Presidente: U. Arena (IT)

S.-H. Song, J.-K. Kim, J.-W. Kim, C.-W. Park, J.-S. Kim (KR)

Steam gasification of wood using a two-stage gasification process: How to avoid bed agglomeration and tar problems simultaneously in a fluidized bed gasification.

N. Tanigaki, N. Fukuda, J. Takada, T. Izumiya (JP)

Development of an advanced shaft furnace gasification technology for municipal solid waste in a commercial scale plant

R. Zhang, K. Oshita, T. Shida, K. Nakajima, H. Toshioka, M. Takaoka (JP)

Steam gasification as a sustainable strategy for automotive wire harness treatment and syngas production

V. Arconati, C. Boccia, F. Parrillo, F. Ardolino, G. Ruoppolo, U. Arena (IT)

Hot syngas clean-up by catalytic cracking of tars: the effect of main parameters

SESSION B5 / CORTE ROOM / 15:00-16:00

NATIONAL STRATEGIES AND CASE STUDIES

Chair / Presidente: M. Schiavon (IT)

G.J. Gaogane, P. Sekoai, C. Trois (ZA)

Innovative bioenergy solutions for developing nations: dark fermentation and anaerobic digestion of abattoir waste

Q. Thabit, V. Ekanthalu, Z. Asiedu, S. Narra, M. Nelles (DE)

Gaps and challenges of the waste management sector in Senegal

J. Faitli, C. Leitold, C. Ágoston (HU)

The evolution of the Hungarian MSW sampling methodology from Pierre Gy's MODECOM to sophisticated EPR and DRS based one

A.C. Gutierrez-Gomez, V.P. Garcilasso, M.M. dos Santos, J.R. Meneghini, K.L. Mascarenhas, M.S. Buckeridge, S. Coelho (BR)

Perspectives for production and use of renewable hydrogen from biomass residues and waste in Brazil

S. Rohit, M.K. Chandel (IN)

Assessment of integration of solar dryer, incinerator, and anaerobic digester for enhanced energy recovery from the municipal solid waste

COFFEE BREAK / 16:00-16:30

SESSION C5 | VALLARESSO ROOM | 15:00-16:00

WORKSHOP: FROM WASTE TO WEALTH: EXPLORING THE POWER OF AGRO-INDUSTRIAL WASTE

Chairs / *Presidenti*: S. Bertolini, S. Silvestri (IT)

The management of biowaste and agro-industrial waste is gaining attention due to their disposal costs and environmental issues. Biorefineries are a promising solution since they combine waste utilization with the production of value-added products, including organic fertilizers. The most crucial component for adding nutrients to the soil and promoting soil fertility and plant growth is fertilizer. Continuous and excessive use of chemical fertilizers to boost agricultural yields causes soil damage in terms of nutrient loss, groundwater and surface water contamination, soil acidity or basicity and microbial population decline. On the other hand, organic fertilizer improves soil fertility, physical and chemical characteristics, water retention capacity, soil pH and soil enzyme activity. In a circular economy framework, the use of organic fractions of municipal waste, agri-based feedstock and byproducts from agro-industrial activities has drawn much attention in terms of environmental sustainability and technological innovation. Such feedstocks can be converted into a spectrum of valuable products like biofuels, biofertilizers and biomolecules for green chemistry using a variety of technologies, including consolidated processes like composting and anaerobic digestion and other more innovative like hydrothermal carbonization. The economic and ecological effects of these techniques have been largely documented in the literature and can contribute to many integrated pathways, such as energy production, greenhouse gas emission reduction and byproducts valorization. Given the background, the main task of the workshop will be to discuss and analyze the opportunities and the limits related to biomass valorization in terms of energy, organic substances, nutrients and other molecules recovery minimizing environmental impact.

Agenda:

- *Sara Bertolini - Fondazione Edmund Mach (IT)*
"SMS-Green" project: from apple pomace to soil amendments
- *Luca Fiori - University of Trento (IT)*
Agro-industrial waste and circular economy: R&D projects based on hydrothermal, biochemical and extraction processes by the Green Processes Engineering group at the University of Trento
- *Tania Sinicco - CREA, Viticulture and Enology Research Centre (IT)*
RUSTICA project: converting fruit and vegetable residues into novel bio-based fertilisers

COFFEE BREAK | 16:00-16:30

TUESDAY NOVEMBER 26

AFTERNOON

FOCUS SESSION III

SALONE DEL RIDOTTO | 16:30-18:00

ENERGY AND CIRCULAR ECONOMY: WHAT ARE PROPER PRODUCTS FROM WASTE TREATMENT TO IMPROVE CE?

Moderators:

Prof. Dezhen CHEN, *Tongji University (CN)*

Prof. Jianhua YAN, *Zhejiang University (JP)*

Panelists:

to be confirmed

Circular Economy (CE) refers to all the activities of reduce, reuse and recycle (3R) in production, circulation, and consumption. It is an important route to achieving a resource-saving and environmental friendly society. Waste to energy or energy products contributes greatly to CE. How to choose energy or proper energy products strategically to achieve both environmentally and economically satisfied CE?

Some scientists performed LCA or LCO (Life cycle optimization) on different energy products to develop sustainable business model for choosing proper energy products. Presently, WtE plants are widely available.

However, the income or subsidies of WtE plants have been declining; while the energy products other than heat and electric power are very few, except for some limited experiences on producing oil from homogeneous wastes such as waste plastics and tires. This raises the question of what kind of energy products should be focused in future?

Some of the questions that will be discussed with experts from Asia, Europe, America and other areas include:

- What kind of energy products should be recovered from waste treatment from both ecological and economic point of views?
- What are the barriers for recovering value-added energy products from wastes?
- Syngas, H₂, oil, CH₄, SAF, methanol etc., which are the proper energy products to achieve satisfied CE from waste management?
- The tools to decide the proper CE mode (resources or energy recovery) for a specified scenario?

Professor Dezhen Chen is the director of the Institute of Thermal & Environmental Engineering in Tongji University since 2013 and had been promoted to be professor since 2005. Since 1992 Dezhen Chen has been working with municipal solid waste (MSW) incineration and the related pollution control when she began her master thesis, since then she has been working in the WM area with the similar topics for 26 years. Her research interests include innovative waste to energy technology development, incineration flue gas cleaning, MSWI fly ash disposal, life cycle assessment (LCA) of waste management and technologies. She has published about 130 papers in Chinese & international journals and own more than 20 patents, including 2 American patents.



Prof. Dezhen CHEN
Tongji University (CN)

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Professor Jianhua Yan is the vice president of Zhejiang University, director of National Engineering Laboratory for Waste Incineration Technology and Equipment, and chair professor of the Cheung Kong Scholars Award Program. His major research interests include clean combustion, pyrolysis and gasification, pollutant control, combustion acquisition, environmental protection in the energy conversion process and waste derived energy, etc. He has published 305 scientific papers and eight books. He owns 57 Chinese invention patents. He got one State Technology Invention Award (second prize), three State Science and Technology Progress Awards (second prize) and one State Innovation Team Award. Professor Yan served as co-chair of the Association of Chinese Graduate School (ACGS) from 2012 to 2016. He is a member of the Discipline Appraisal Group under the State Council. He is vice chairman of the National Alliance of Innovative Waste to Energy.



Prof. Jianhua YAN
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TUESDAY NOVEMBER 26

SOCIAL EVENT

BACARO TOUR WITH THE SYMPOSIUM STAFF / TOUR DEI BACARI VENEZIANI CON LO STAFF

Meeting point: Hotel Monaco & Grand Canal, h. 19:00

On Tuesday 26 November, join the Symposium staff in a “Bàcaro Tour”, a typical Venetian itinerant ritual!

The Bàcaro tour is an alternative and funny way to discover the city by night, going from bacaro to bacaro, around the *sestieri* (districts) of Venice, to enjoy a few glasses of wine or spritz with friends.

Bàcaro is a typical venetian tavern characterized by a warm and familiar atmosphere, where glasses of wine (*ombre*) are served along with appetizers (*cicheti*). Cicchetti are small snacks or side dishes, similar in concept to Spanish tapas. Common cicchetti include tiny sandwiches, plates of olives or other vegetables, halved hard boiled eggs, small servings of a combination of seafood, meat and vegetable ingredients laid on top of a slice of bread or polenta, and very small servings of typical full-course plates.

Generally “bacari” have a good price/quality ratio, compared to touristic bars.

Grouped in 6/8 people and guided by local friends and members of our staff, we will discover the most authentic “bacari” of the city.

All participants will pay for their own drinks and snacks.

In order to organize the groups, please book your place at the registration desk on your arrival.



DAY 3 WEDNESDAY
NOVEMBER 27

WEDNESDAY NOVEMBER 27

MORNING

SESSION A6 / SALONE DEL RIDOTTO / 9:00-10:00

CARBON CAPTURE

Chair / Presidente: L. Lombardi (IT)

T.F. Astrup, D Kuri, J. Haukohl, S. Halevi, M. van Brunt (DK)

Energy-from-waste – What is the potential to provide net-negative carbon emissions?

R. Salvador, R.-A. Doong (TW)

Carbon sequestration potential within solid waste management

L. Cretarola, F. Viganò (IT)

Review of BECCS technologies with a specific focus on combustion-based processes

L. Cretarola, F. Viganò (IT)

Performance comparison of various BECCS options

M. Spinelli, C. Artini, M. Gatti, M.C. Romano, S. Consonni (IT)

WTE with negative CO₂ emissions via CaLooping: the Horizon Europe HERCULES project

SESSION B6 / CORTE ROOM / 9:00-10:00

ANAEROBIC DIGESTION: REACTOR DESIGN AND CONTROL

Chair / Presidente: M.K. Chandel (IN)

D. Krahe, J. Herfurtner, F. Brück, U. Theilen, H. Weigand, S. Annas (DE)

Mixing in a model rotating drum AD reactor characterized by particle tracking and computational fluid dynamics

W. Chung, S. Chang, D. Bang, G. Lim, M. Kim, J.T. Kim, S. Yang (KR)

Application of lab-scale anaerobic digestion with AI (Artificial Intelligence) model

D. Bona, L. Grandi, S. Bertolini, D. Scrinzi, S. Silvestri, M. Zorzi (IT)

Monitoring seasonal efficiency of dry anaerobic digestion plant

S. Choi, S. Hwang (KR)

Transformer-based anaerobic digestion time series forecasting model: inference to interpretation

M.T. Valentin, A. Bialowiec (PL)

The Proof-of-Concept: the modelling of the evolution of inoculum and substrate inside a continuous flow anaerobic reactor

COFFEE BREAK / 10:00-10:30

SESSION C6 / VALLARESSO ROOM / 9:00-10:00

WORKSHOP: KNOWLEDGE GAPS ON PFAS THERMAL DEGRADATION

Chair / *Presidente*: T. Rashwan (UK)

Per- and polyfluoroalkyl substances (PFAS) have been central compounds used in a range of modern materials – everything from fire-fighting foams to cosmetics. Altogether, there are thousands of synthetic compounds within the PFAS classification. It is now widely understood that PFAS contamination poses severe environmental risks. Due to PFAS' toxic and persistent properties, small concentrations can bioaccumulate in the food chain, affecting human and environmental health.

Activated carbon or ion exchange resin have been used to remove PFAS from drinking water. Anesthetic gases such as isoflurane, desflurane, and sevoflurane have been widely used in medical applications; these gases are trapped in activated carbon after use for disposal. Other PFAS-contaminated materials (e.g., municipal solid wastes, sewage sludge, and hazardous wastes) necessitate active treatment.

Thermal treatment methods have shown strong promise in breaking PFAS down at high-temperature conditions (e.g., above 850°C). However, there many research gaps regarding the fate of PFAS in these thermal systems, which are critical to solve now because even small concentrations of PFAS – e.g., from incomplete destruction – can pose long-lasting and challenging environmental risks for future generations.

Agenda:

This workshop will focus on the research needs in addressing PFAS fate in thermal waste systems, including:

- Characterizing products of incomplete combustion from PFAS thermal treatment in gaseous systems
- Challenges associated with closing the fluorine balance
- The role of temperatures, residence times, mixing, and water vapor in full PFAS destruction to HF
- The role of fluorine mineralization (e.g., to CaF_2)
- Need for comparisons between lab- and full-scale results

COFFEE BREAK / 10:00-10:30

WEDNESDAY NOVEMBER 27

MORNING

SESSION A7 / SALONE DEL RIDOTTO / 10:30-11:30

RESOURCES RECOVERY FROM INDUSTRIAL AND COMMERCIAL WASTE

Chair / Presidente:

P.T. Triwigati, S. Noh, S. Moon, E. Kim, Y. Park (KR)

Waste to Resource: feasibility study on ligand-based pH swing process for selective recovery of manganese and calcium carbonate from steel slag

K. Shu, C. Chuaicham, K. Sasaki (JP)

Photocatalytic H₂ evolution on TiO₂/Fe-doped hydroxyapatite derived from converter slag

H.N. Ly, W.R. Lee, S. Kim (KR)

Advanced indoor air treatment: tungsten-doped titanium dioxide nanohybrids for photocatalytic toluene removal

X. Lü, T. Lu (FI)

Waste heat potentials from liquid cooled data centres for sustainable building heating solutions

SESSION B7 / CORTE ROOM / 10:30-11:30

ANAEROBIC DIGESTION: PROCESS ENHANCEMENT

Chair / Presidente: R. Stegmann (DE)

J.W.C. Wong, L. Luo (HK)

Regulation of acidogenic fermentation through exogenous additives for promoting carbon conversion of food waste in two-phase anaerobic system

J.H. Lee, J.Y. Choi, J.H. Lee, D.Y. Kim, E. Lee, K.Y. Park (KR)

Impact of sonication pretreatment on phosphorus release and adsorption from livestock manure anaerobic digestate

J. Kim, J. Y. Kim (KR)

Mitigating calcium inhibition in organic sludge digestion through CO₂ injection

Z. Shi, P. He, J. Guo, W. Peng, H. Zhang, F. Lü (CN)

The impact of mechanical pretreatment system on carbon reduction: A field study of an industrial-scale biogas plant in China

SESSION C7 / VALLARESSO ROOM / 10:30-11:30

WORKSHOP: LOW TEMPERATURE THERMAL CONVERSION

Chair / *Presidente*: L. Fiori (IT)

Y. Ryckmans (BE)

Hydrothermal carbonisation of organic waste for thermal energy generation

J.-W. Kim, C.-W. Park, J.-Si.Kim (KR)

Treatment of a waste polyvinyl chloride with a new type of 3-stage thermo-chemical conversion process

WEDNESDAY NOVEMBER 27

MORNING

SESSION A8 / SALONE DEL RIDOTTO / 11:45-12:45

COMBUSTION RESIDUES

Chair / Presidente: G. Costa (IT)

G. Dodbiba, X. Zhang, T. Fujita (JP)

Novel approach for efficient removal of Chloride ions from incinerator bottom ash using Acetic acid and CO₂ micro-bubbling

C. Lanzerstorfer (AT)

Differences in the composition of fine cyclone fly ash and ESP fly ash from woody biomass combustion

Z. Liu, Y. Xia, L. Wang, J. Yan (CN)

Recycling waste incineration fly ash and red mud into novel geopolymer

F. Lapp, F. Schmutzler, F. Brück, T. Liebich, M. Lang, U. Theilen, H. Weigand (DE)

Potential of pelletized bottom and fly ashes from wood combustion for sustainable H₂S removal from biogas

C. Owusu Prempeh, A.J. Babafemi, I. Hartmann, M. Nelles (DE)

Post-treatment of sugarcane bagasse ash: a comparative analysis of acid treatment and sol-gel process

SESSION B8 / CORTE ROOM / 11:45-12:45

ALGAL BIOMASS FOR ENERGY APPLICATION

Chair / Presidente:

E. Pozzuoli, M. Iovinella, C. Auciello, S. Papa, M.R. di Cicco, C. Lubritto, C. Cini-glia (IT)

Industry of the Algae Production in Europe - The future and possible application in a circular and eco-friendly bioeconomy

F.G. Torres, A. Urtecho (PE)

Algae biomass for energy applications

H. Velten, N. Hasport, D. Reinecke, U. Theilen (DE)

Biogas yield of microalgae biomass harvested from two different algae-based wastewater treatment systems

G. Lim, W. Chung, S. Chang, M. Park, S. Hong, B. Jeon, S. Choi (KR)

Research on eco-friendly biofuel production technology using microalgae: Hydrothermal Liquefaction (HTL)

LUNCH BREAK / 12:45-15:00

SESSION C8 / VALLARESSO ROOM / 11:45-12:45

FEEDSTOCK

Chair / Presidente: M. Kornaros (GR)

O.P. Troncoso, F.G. Torres, V. Delgado (PE)

The potential of native starch biomass to produce materials for energy applications

E. Sygula, A. Bialowiec (PL)

Application of the fractal dimension analysis of the chromatograms for profiling the volatile organic compounds release from lignocellulosic biomass

J. Darmey, S. Narra, O.-W. Achaw, J.C. Ahiekpor, B. A. N'guessan Cougouais (GH)

Comparative analysis of lignocellulosic composition characteristics of organic municipal solid wastes: insights from Kumasi and global cities for biogas feedstock

L.M.D.R.S. Martins, A.P.C. Ribeiro, M.J.O. Martins, A. Figueiras, I.A.S. Matias (PT)

Innovation in insect biomass valorization: towards a sustainable future

J. Qiu, F. Lü, H. Zhang, P.-J. He (CN)

Molecular insights into the biological treatment process of waste leachate

LUNCH BREAK / 12:45-15:00

WEDNESDAY NOVEMBER 27

AFTERNOON

SESSION A9 / SALONE DEL RIDOTTO / 15:00-16:00

HYDROGEN PRODUCTION AND UTILIZATION

Chair / Presidente: L. Martins (PT)

E.K. Byeon, H.-I. Kim (KR)

Sustainable hydrogen production via electrolysis of ammonia in landfill leachate

D. Cuesta-Mota, L. Canals Casals, V. López-Grimau (ES)

Hydrogen production during the electrochemical treatment of textile dyeing concentrates rejected from nanofiltration

G.S. Ganesh, S. Dasappa, B. Patil, A.M. Shivapuji (IN)

Comparative economic and environmental performance assessment of biomass gasification pathway for green H₂ production

F. Ardolino, F. Parrillo, U. Arena (IT)

Environmental performance of a regional railway transportation fueled by hydrogen from waste

SESSION B9 / CORTE ROOM / 15:00-16:00

FATE AND DEGRADATION OF BIOPLASTICS IN ANAEROBIC DIGESTION

Chair / Presidente:

F. Marchelli, L. Fiori (IT)

Waste bioplastics in anaerobic digestion: challenges and hydrothermal solutions

Y. Ahn, M. Lee, S. Kim, E. Choi, J. Park (KR)

Bacterial and archaeal population dynamics in thermophilic hydrogenotrophic methanogenic microbial communities degrading PLA bioplastics

W. Peng, Z.Y. Su, F. Lü, H. Zhang, P.J. He (CN)

Enhanced bioenergy recovery through co-digestion of biodegradable packaging materials with food waste

COFFEE BREAK / 16:00-16:30

SESSION C9 | VALLARESSO ROOM | 15:00-16:00

WASTE MANAGEMENT OPTIMIZATION FOR RESOURCES RECOVERY

Chair / Presidente:

H. Zou, P. He, H. Zhang (CN)

Machine learning-aided rapid identification of municipal solid waste using optical reflectance spectra

W. Bauer, B. Lipowsky, K. Löber (DE)

Benchmarking Municipal WEEE Collection in Germany as a tool to prevent fires when collecting old appliances

K. Silvennoinen, E. Lehtonen, X. Liu, V. Lampi, S. Nisonen (FI)

The food waste model for food services: focus on the Helsinki Metropolitan Area

S.R. Kong, G. Sim, Y. Park (KR)

Two-step leaching process for resource recovery: recovery copper and gold from the end-of-life LEDs with volatile fatty acids

M. Freiburger, S. Rivic, O. Cencic, A. Prskawetz, H. Rechberger, C. Scharff (AT)

Understanding the limitations of recycling and utilization rate targets for circular plastics management: a general economic equilibrium model including material flow analysis

COFFEE BREAK | 16:00-16:30

WEDNESDAY NOVEMBER 27

AFTERNOON

FOCUS SESSION IV

SALONE DEL RIDOTTO | 16:30-18:00

CARBON CAPTURE: A WAY TO DECARBONISE THE WASTE SYSTEM?

Moderator:

Prof. Thomas Astrup, *Ramboll Denmark (DK)*

Panelists:

to be confirmed

Carbon emissions from biomass and waste-to-energy facilities represent one of the main challenges for these technologies in a climate perspective. While still a new technology, carbon capture (CC) has the potential to limit direct carbon emissions from both biomass and waste-to-energy facilities.

The captured carbon could be stored in subsurface deposits (CCS), or potentially utilised e.g. for fuel production (CCU) in combination with use of green electricity.

Carbon capture can be seen as a practical way to decarbonise the waste system, create net-negative emissions, and/or capture biogenic CO₂ for biofuel production. But the approach may also be found to legitimise potential carbon emissions that could otherwise be avoided.

What are heads and tails in this? This focus session discusses key questions in relation to carbon capture:

- With carbon capture (CC) available as an emission control technology, should CC be considered best-available-technology on waste and biomass combustion facilities in the future?
- How important is CC for the overall carbon balance of biomass and waste-to-energy?
- Should we focus on carbon storage (CCS) or carbon utilisation (CCU)?
- Could biogenic carbon removal certificates be important in the future?

Thomas Fruergaard Astrup, former Professor at the Department of Environmental Engineering of the Technical University of Denmark, works at Ramboll Denmark as sustainability lead in the global energy division. He has an impressive career in research, which includes activities related to environmental sustainability of circular economy and waste management, for example energy and resource recovery, circularity of materials and characterisation of waste, and sustainability assessment modelling such as life-cycle assessment (LCA) and life cycle costing (LCC) at technology and system level. He has authored a range of international journal articles and conference proceedings within these topics and is a member of international research groups and a referee for international scientific journals within in the field. He also manages a wide range of research projects funded by Danish municipalities, waste management companies, and research programmes.



Prof. Thomas Astrup
Ramboll Denmark (DK)

Contact:
THAP@ramboll.com

WEDNESDAY NOVEMBER 27

SOCIAL EVENT

GALA DINNER AND MASQUERADE PARTY / CENA DI GALA E FESTA IN MASCHERA / Hotel Monaco & Grand Canal, h. 20:00

We will close the Venice Symposium with an exciting social event in the beautiful setting of Salone del Ridotto in the Hotel Monaco & Grand Canal, historically known for hosting the wildest parties and entertainment in Venice during the XVII century.

To make these spaces relive the glories of the past, on Wednesday, 27 November, join the Gala dinner and Masquerade party and celebrate with us the closure of the conference with a dancing night in typical Venetian style.

DRESS CODE: Black or Red with a Venetian Mask!

The event will consist of a welcome cocktail followed by a seated dinner, music and dance entertainment, starting from 20:00 to the early hours!

The Gala Dinner menu is available on the website and symposium app.

50% of the price is included in the Symposium entrance fee. The remaining 50% will be paid by each delegate and amounts to € 65,00 + VAT 22%.

Accompanying persons should purchase the full ticket (€ 130,00 + VAT 22%) from the secretariat.

In order to take part in the event, **reservation is mandatory by Tuesday morning (26 November)**. Tickets should be collected from the Secretariat desk starting from Monday, 25 November.

FIND YOUR MASK AT KARTARUGA

We are honoured to partner with Kartaruga, a prestigious artisan workshop that creates wonderful Venetian handmade masks for theatre, cinema productions and haute couture shows. Discover the creativity of its workshop in their studio "Il Canovaccio" (address: Castello 5369 - Calle delle Bande, few steps from Piazza San Marco) and find your exclusive mask to wear at our party. Prices starting from € 30, 10% discount reserved only for Symposium delegates!



POSTER SESSION
SESSIONI POSTER

POSTER SESSION

SESSIONI POSTER

Posters will be made available to Symposium delegates at all times only in digital format on our official app and on a designated computer in the Oppio Room, projected onto a large monitor.

Delegates will be able to browse through all poster presentations and contact the authors for questions and discussion.

La sessione Poster sarà resa accessibile digitalmente attraverso l'app del Simposio e tramite una postazione pc collegata ad un monitor e sempre disponibile nella Sala Oppio. Sarà possibile visualizzare tutte le presentazioni poster e contattare gli autori attraverso la App per eventuali domande e approfondimenti sui poster.

P01 | S. Li, A. Ding, Z. Bian, Y. Xuan (CN)

Design and application of Vanadium-based composite catalysts in biogas cracking for hydrogen production in new energy conversion

P02 | S. Lee, W. Cho, H. Park, M. Seo, J.-Y. Lee (KR)

The evaluation of the bio-drying through mixing of sewage sludge and herbal medicine by-products

P03 | A.B. López, C.J. Cobo-Ceacero, M.T. Cotes-Palomino, A. Dubbelman-Vizcaíno, F.J. Iglesias-Godino, C. Martínez-García, A.C. Revelo-Rodríguez, F.J. Troyano-Pérez, F. Torres-Fernández (ES)

Cost analysis of firing process variables for life cycle costing of sustainable ceramic materials made from waste

P04 | F. Torres-Fernández, C. J. Cobo-Ceacero, M.T. Cotes-Palomino, A. Dubbelman-Vizcaíno, F. J. Iglesias-Godino, C. Martínez-García, A. C. Revelo-Rodríguez, F. J. Troyano-Pérez, A. B. López (ES)

Preliminary development of circularity indicators in the Construction and Demolition Waste (CDW) sector

P05 | I.S. Cho, S. Mishra, S. Lim (KR)

Identifying the sources of black carbon in PM_{2.5} using a tricolor absorption photometer at an urban site in Daejeon during 2024

P06 | L.F. Pereira Marcilio, A.M. Sampaio Pereira, N.R. Marcilio, A.C. de Azevedo (BR)

Produced water on offshore oil platforms in Brazil: characterization, monitoring and environmental impact

P07 | C. Lee, Y.-C. Jang (KR)

Consumption and carbon footprints of single-use plastic cups in South Korea

P08 | D. Bang, J. Shim, B. Jeon, S. Chang, W. Chung (KR)

Metataxonomic characterization and analysis of temperature effects on organic waste biomass composting processes

P09 | *K. Chamrádová, J. Pavlíková, P. Basinas, M. Vráblová, K. Smutná, B. Tenklová, J. Rusín, D. Vrábl, R. Chalupa, I. Koutník (CZ)*

Full-scale co-composting of sewage sludge and waste materials at various mixing proportions and aeration conditions to produce stabilized compost

P10 | *A.K. Wejlah (CN)*

CO₂ dynamics and sorption potential in modified rudiments from silica gel and activated carbon: molecular dynamics simulation

P11 | *W. Jeong, G. Lee, K. Baek (KR)*

Assessment of plant growth and translocation of endogenous heavy metals from swine manure biochar under elevated CO₂ condition

P12 | *S. Jung, S.E. Kim, C. Rhee, S.G. Shin, J. Lee (KR)*

Effect of magnetite particles on anaerobic digestion of phenolic wastewater under increasing ammonia loads

P13 | *F. de Aguiar de Linhares, P. Juarez Melo, N.R. Marcilio (BR)*

Evaluation of atmospheric emissions and ash generated from co-firing of mineral coal with biomass waste

P14 | *S. Kim, J. Kim, J.Y. Kim (KR)*

Silica recovery from residues of anaerobic digestion of rice husk and rice straw

P15 | *Y. Ahn, S. Kim, H. Shin (KR)*

A study on the method of identifying animal species of crushed recycled leather fiber

P16 | *E.C. Rada, L. Adami, A. Castellucci, V. Torretta, M. Ragazzi (IT)*

Modular gasification of waste

P17 | *T. Younas, F. Vegliò, M. Prisciandaro, V. Innocenzi (IT)*

Assessing risks and safety protocols in the dismantling of lithium-ion batteries

P18 | *A.L.V. Cubas, S.S.H. Dias (BR)*

Energy production from wastewater treatment sludge: a case study of Casan in Santa Catarina, Brazil

P19 | *S.-J. Lee, S.-U. Jeong, T.-Y. Ryu, J.-Young Lee (KR)*

Recirculation of process water in the hydrothermal carbonization of wood waste: a sustainable and carbon neutral strategy

P20 | *S.M. Yoon, H. Jo, D. Tokmurzin, M.W. Seo, T.-Y. Mun, J.H. Moon, S.J. Park, S.J. Yoon, J.G. Lee, K. Lee, H.W. Ra (KR)*

A study on syngas production from low-grade waste plastic pyrolysis oil via oxygen/steam gasification using entrained flow gasifier

P21 | *S.-Y. Park, H.-T. Kim, J.-Y. Lee (KR)*

Emissions trading and carbon removal certification methodologies for biochar

POSTER SESSION

SESSIONI POSTER

P22 | *J. Chang, J.-Y. Lee (KR)*

Development of machine learning model for predicting the adsorption characteristics of biochar by waste wood

P23 | *G. Markou, D. Arapoglou, C. Eliopoulos, I. Langousi, E. Kougia, A. Liatiri (GR)*

Biogas production from prickly pears cladodes as a sole substrate

P24 | *T. Kim, S. Kim, J. Kim, J.Y. Kim (KR)*

Analysis of sieving and thermo-alkali pretreatment for enhancing methane production from cow manure

P25 | *P. Basinas, K. Chamrádová, Z. Rybková, J. Rusín, K. Malachová (CZ)*

Investigation on the potential of a biological treatment with *P. Ostreatus* to convert a spent solid anaerobic digestion effluent into a new substrate with significant methane generation capacity

P26 | *A. Kawamura, M. Akahori, T. Ida (JP)*

Continuous production of small-sized bio-coke from adzuki bean harvest residue and its co-firing characteristics with wood pellets

P27 | *Q. Thabit, V. Ekanthalu, Z. Asiedu, S. Narra (DE)*

Aspects and facts of the waste management sector in Ivory Coast

P28 | *J. Havranová, P. Midula, S. Čerňanský (SK)*

The potential of autochthonous plants for lanthanoid extraction from mining waste

P29 | *M. Dimbinandriatahina, J.-L. Rasoanaivo, A. Ravoninjatovo, N. Rabetokotany-Rarivoson (MG)*

Assessment of the bioethanol potential of jackfruit Pulp (*Artocarpus heterophyllus*) from Madagascar

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IWWG - INTERNATIONAL WASTE WORKING GROUP

Find out more about the IWWG activities and its regional brands and become a member. The International Waste Working Group, founded in 2002 and registered as a no-profit organisation, serves as a forum for the scientific and professional community. The IWWG aims to provide an intellectual platform to encourage and support integrated and sustainable waste management and to promote practical scientific development in the field.

The group was conceived to provide a “home” for professionals and researchers, and give us a voice to be able to beneficially influence waste management and research.

The benefits of IWWG membership are the following:

- Subscription to IWWG official Journal Waste Management at a special discount price, both print subscription (135,00€) or print+electronic subscription (166,00€). Electronic subscription includes access to back numbers from 1995
- FREE individual subscription to Detritus, available only for IWWG members (an administrative cost of 20 € is required). Please subscribe here
- Access to all the contents included in the Members Area: proceedings and presentations from IWWG conferences (included previous editions), Task groups outputs, recordings of the IWWG seminars and lectures (i.e. Food for brain)
- Discount on the entrance fee of IWWG international waste management symposia (official IWWG conferences)
- Discount on IWWG Seminar Registration
- Discount on IWWG publications (e.g. textbooks)
- Discount on Elsevier publications
- Participation in the General Assembly (GA) meeting. The GA meets (at least) once a year.
- Participation in all activities of IWWG including Task Groups

NEW WEBSITE AVAILABLE! WWW.IWWG.EU

For further information please contact:
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Email: info@iwwg.eu
Website: www.iwwg.eu



UPCOMING IWWG EVENTS / PROSSIMI EVENTI IWWG

- **WasteSafe 2025** – 9th International Conference on Sustainable Solutions for WM in DC's22-23
February 2025
Khulna University of Engineering & Technology - Khulna, Bangladesh
www.wastesafe.info
- **SUM 2025** - 8th Multidisciplinary Symposium on Circular Economy and Urban Mining
21-23 May 2025
Procida, Naples, Italy
www.sumsymposium.it
- **Sardinia 2025** - 20th International Symposium On Waste Management, Resource Recovery and Sustainable Landfilling
13-17 October 2025
Forte Village Resort, S. Margherita di Pula, Italy
www.sardiniasymposium.it

ORGANISING SECRETARIAT SEGRETERIA ORGANIZZATIVA

EUROWASTE SRL

Eurowaste Srl is an event planning and management company initially established to handle scientific communication deriving from research work carried out in the field of environmental engineering at the University of Padua. Over time, the company has evolved into a service agency operating on a national and international level in the sector of scientific conferences and events.

For more than 30 years, Eurowaste has been involved in the organisation of international scientific symposia, several editions of which have attracted attendance by more than 1000 delegates from all over the world.

The company's activities are accessible to the Scientific Community worldwide in the form of support in the conception, organisation and realization of conferences, international symposia, meetings, workshops and all types of events.

Services provided

Based on the aims and participant targets set by the client, the specific events budget, the international reach of the event, specific focus of partners and sponsors and reproducibility of the event, Eurowaste develops a purpose-designed event format for the client based on the following activities:

Event concept and design / Support to the Scientific Secretariat in defining the technical and scientific programme / Conception and organisation of social events / General assistance in initial start-up of the event / Budget Planning / Graphic design and conference material / Website development and management / Communication / Speaker and Author management / Venue sourcing and Catering / Logistic planning.

Eurowaste also manages a publishing house with the opportunity to produce and publish the scientific proceedings of the event (Cisa Publisher, pag. 72)

If you want to organize a conference, rely on us!

For further information please send an email at info@eurowaste.it



Euowaste Srl è una società di pianificazione e gestione eventi nata inizialmente per gestire la comunicazione scientifica derivante dai lavori di ricerca nel settore dell'ingegneria ambientale dell'Università di Padova. Nel corso degli anni, l'azienda si è evoluta in un'agenzia di servizi operante a livello nazionale e internazionale nel settore dei convegni e degli eventi scientifici.

Da oltre 30 anni, Euowaste è coinvolta nell'organizzazione di simposi scientifici internazionali, diverse edizioni dei quali hanno attirato la partecipazione di più di 1000 delegati provenienti da tutto il mondo.

Le attività della Euowaste si rivolgono a tutta la comunità scientifica mondiale come supporto nella concezione, organizzazione e realizzazione di conferenze, simposi internazionali, workshop e altri tipi di eventi.

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Basandoci sugli obiettivi e sui target dei partecipanti stabiliti dal cliente, sul budget specifico, sulla portata internazionale dell'evento, sul focus specifico dei partner e degli sponsor e sulla riproducibilità dell'evento, Euowaste sviluppa un formato di evento "su misura" offrendo le seguenti attività:

Concept e design dell'evento / Supporto al Segretariato Scientifico nella definizione del programma tecnico e scientifico / organizzazione degli eventi sociali / Assistenza generale nella fase iniziale di avvio dell'evento / Pianificazione del budget / Progettazione grafica e materiale per la conferenza / Sviluppo e gestione del sito web / Comunicazione / Gestione degli speaker e degli autori / Ricerca della sede e catering.

Euowaste gestisce anche la propria casa editrice, offrendo l'opportunità di produrre e pubblicare gli atti scientifici dell'evento (Cisa Publisher, pag. 72)

Se desideri organizzare una conferenza, affidati a noi!

Per informazioni e richieste di preventivo si prega di inviare un' email a:

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DETRITUS / MULTIDISCIPLINARY JOURNAL FOR WASTE RESOURCES AND RESIDUES

Detritus is an official journal of IWWG, International Waste Working Group, published by Cisa Publisher.

The journal is aimed at extending the “waste” concept by opening up the field to other waste-related disciplines (e.g. earth science, applied microbiology, environmental science, architecture, art, law, etc.) welcoming strategic, review and opinion papers.

Detritus is indexed in SCOPUS / Clarivate Analytics, Web of Science / Google Scholar.

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As you may know, in 2023 Detritus turned from Open Access to a classic format. In line with the philosophy of the journal, Detritus continue to be **completely free for authors** who intend to submit and publish a paper, with the aim of promoting the transfer of scientific knowledge without any economic constraints.

Anyhow, the journal gives authors the possibility to publish their research in **Open Acces**: articles will be immediately and permanently freely available to both subscribers and the wider public with permitted reuse.

Authors wishing to publish their paper in Open Access will be charged an Article Processing Charge (APC) of € 500 + VAT 22%.

Please contact the editorial office at editorialoffice@detritusjournal.it



The advertisement features a dark wood-grain background. On the left, there is a stack of white papers with a pencil resting on top. In the center is the cover of the Detritus journal, Volume 19, September 2024. The cover has a teal top half with the journal title and a bottom half showing a photograph of people sitting on a pile of waste. To the right of the journal cover, there is a white notebook with a pencil icon on its cover. The text on the right side of the advertisement is as follows:

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Editor in Chief: Raffaello Cossu
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Journal for Waste
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CASA EDITRICE UFFICIALE

CISA PUBLISHER

Cisa Publisher is an imprint of Eurowaste Srl. Cisa Publisher represents the Eurowaste section dealing with transfer to the media (books, reports, textbooks, CD, etc) of the wealth of information accumulated throughout activities performed by the University of Padova (in particular in the field of waste management and contaminated site remediation) and by IWWG and member scientists.

CATALOGUE

Conference Proceedings - Usb drive pen:

- Sardinia International Symposium on Waste Management, Resource Recovery and Sustainable Landfilling
- SUM - Multidisciplinary Symposium on Circular Economy and Urban Mining
- Venice International Symposium on Energy from Biomass and Waste

Detritus - Multidisciplinary Journal for waste resources and residues

Books:

R. Cossu, V. Grossule, M.C. Lavagnolo

La discarica sostenibile. Ruolo nell'economia circolare e proposte normative

IWWG Monograph series:

- Sustainable Landfilling
- Landfill Aeration

Other Monographs:

- Urban Mining: A global cycle approach to resource recovery from solid waste

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SUM 2025

8th SYMPOSIUM ON CIRCULAR ECONOMY AND URBAN MINING
21 - 23 MAY 2025 / PROCIDA, Naples, Italy

SUM BECOMES A MULTIDISCIPLINARY ANNUAL EVENT AND GOES TO PROCIDA! SAVE THE DATE!

SUM 2025 - 8th Multidisciplinary Symposium on Circular Economy and Urban Mining will be held from **21 to 23 May 2025** in the stunning island of Procida (Naples, Italy), a gem in the Bay of Naples, crowned Italy's Capital of Culture in 2022.

Considering the intense and rapid development of topics and issues related to Circular Economy, observing the growing need for a multidisciplinary approach and ascertaining that the voice of the scientific community should influence more heavily the political decisions regarding Circular Economy, the **SUM Symposium has become a multidisciplinary annual event.**

The main aim of this decision is to promote a more continuous interaction (discussion, collaboration, exchange of experiences, etc.) between different disciplines with the full scientific engagement of intra-, cross-, multi-, inter-, and trans-disciplinary research teams, involving any stakeholders or entity that strategically drives its activity on a scientific basis.

The list of disciplines which are interested includes Agronomy, Biology, Chemistry, Economics, Engineering, Epidemiology, Geosciences, Law, Material Science, Medicine, Psychology, Sociology, etc. Each of them is working inside their individual area without fully exploiting the huge potential of a synergic, not competing, collaboration. And the effect of that might virtuously influence industrialists, business people, government officials, non-governmental organizations, local authorities, politicians.

In summary, the final goal of SUM is to promote globally Circular Economy thinking by advancing conceptually and technologically, while solving any critical issues.



THE CALL FOR PAPERS IS OPEN: DEADLINE 10TH MARCH 2025

SYMPOSIUM TOPICS:

1. CONCEPTS IN SAVING, RECOVERY AND RECYCLING OF MATERIAL RESOURCES	Critical raw materials (scarcity, supply limitations, geopolitical uncertainty, ethical issues, etc.), Circular Economy, Urban Mining, Prevention, Footprint, Zero Waste, Closing the loop, Sustainability, Role of Energy recovery in Circular Economy, Ecological Economy, Social and Solidarity Economy, Greenhouse Gas Reduction through formal and informal recycling, etc.
2. PREVENTION, MINIMISATION AND PREPARING FOR REUSE	Avoidance best practice, Ecodesign, New business models, Industrial symbiosis, Lengthened longevity, Broadened use of consumer products, Extended Producer Responsibility (EPR), Repairability and reuse, Take-back programs such as refund, Service sharing, Leasing concepts, Dematerialization, Remanufacturing products and components, Disassembly, Refurbishment, Valorisation of components, Marketing of remanufactured products and components, etc.
3. SOURCES AND CHARACTERISATION OF VALUABLE MATERIALS	Sources and characterization of materials in urban areas (MSW, C&D Waste, commercial waste, special waste, end of life vehicles, scrap tires, electric and electronic waste, windpower plant wings, photovoltaic panels, garden and park waste, used oils, fat oil and grease (FOG), bilge waters, domestic and commercial, sludge etc.)
4. RECOVERY OF RESOURCES FROM WASTEWATERS	Phosphorous from sludge, fat oil and grease (FOG), bilge waters, domestic and commercial wastewater, sludge etc., insects biomass
5. MATERIALS SORTING AND RECOVERY OF VALUABLE MATERIALS	Source segregation and separate collection, manual sorting, sensor-based application to different material flows, technologies for the extraction of valuable materials, AI applications
6. TREATMENT AND RECYCLING OF RECOVERED MATERIALS	Mechanical, biological, chemical and thermal treatment, biorefinery, re-manufacturing, nature-based solutions for sustainable circular economy (phytoreduction, use of Black Soldiers Fly in waste treatment, etc.)
7. RECOVERY AND RECYCLING OF WASTE BIOMASS	Biomass quality, Segregation and recovery of biomass, Conversion technologies, Disposal of unsorted biomass, Biostabilisation indexes
8. ENHANCED LANDFILL MINING	Preliminary surveys, excavation procedures, sorting and treatment of excavated material, valorization and destination of different fractions, regulatory and administrative issues, challenges to landfill mining in the global South...
9. QUALITY CONTROL ALONG RECYCLING CHAIN	Control of contaminants in original products, Control and fate of contaminants in recycling, Quality of recycled products, Carbon, water and energy footprint of material recycling, etc.
10. CONTAMINANTS FROM CIRCULAR ECONOMY IN THE ENVIRONMENT	Contaminants and accumulation in recycled products, Accumulation in the environment, Microplastics and Forever Chemicals (PFAS) in products and in the environment, etc.
11. POTENTIAL HEALTH IMPACTS IN CIRCULAR ECONOMY	Accumulation of contaminants in animals, plants and humans, Microbial features and biorisk prevention, Ecotoxicological risks, Potential health effects, Epidemiology, etc
12. INTERACTION BETWEEN MATERIAL FLOWS IN SOCIETY AND NATURE	CLOSING MATERIAL LOOPS, ENVIRONMENTAL IMPACTS, CLIMATE CHANGE; BIODIVERSITY: Mass balance approach, recirculation pathways and markets, quantity and quality of final residues, treatment and disposal options, final sinks, design and environmental impact control, role of sustainable land repository of residual waste, backfilling, biodiversity, impact on climate change and global pollution, etc.
13. ECONOMIC AND FINANCIAL ASPECTS	Waste focused circular business models and ecosystems, Networks for circular innovation, Extended Producer Responsibility, Full costs accounting, Economic and Environmental Performance management, Management fees, Financial incentives, Effectiveness of bans and fines, Flexibility of markets, Organising the circularity of waste flows and stocks, Payment for environmental services in waste management, Financial role of the governments (subventions, social comforting), Global trade impact on CE and embodied environmental impact, Reuse and environmental impact of exported used products to DCs), etc.

14. POLICIES AND LEGAL ASPECTS	New EU regulations, Circular Economy under specific conditions (eg. Public events), Green procurements, Interfaces between the different scientific disciplines, public policies for social recycling, comparison of regulations for waste and products, by products, End of waste (public policies, regulations, problems, criticism, intermediate products), regulation addressing national and international transport of waste materials, legal and illegal circular economic activities, global policies and treaties on waste, how to better involve consumer product developers, etc.
15. TOOLS & INSTRUMENTS FOR ASSESSMENT AND EVALUATION	Material Flows Analysis (MFA), Circularity indicators, Cost-benefit analysis, LCA, Environmental Impact Assessment, Carbon accounting, Carbon emission reduction, Carbon neutral, Energy balance, etc.
16. EDUCATION, COMMUNICATION, SOCIAL AND PSYCHOLOGICAL ASPECTS	Educational private and public projects, Participatory approaches and dispute management, Communication campaigns, Factors influencing individual behaviour in minimization, Source segregation, Recycling, Use of recycled products, Waste related curricular concerns in formal education, Waste and Art, etc.
17. ARTIFICIAL INTELLIGENCE AND DIGITAL SOLUTIONS FOR CIRCULAR ECONOMY	AI (Artificial Intelligence), ML (Machine Learning), IoT (Internet of Things), Big Data, cloud and edge computing, specific software for product design, manufacturing (including supply chains for procurement), logistics, sales e-trading, business analytics and any other circular economy steps, potentiality of the Augmented Reality (AR) in the field of Waste Management, etc.
18. ECOCITIES AND CIRCULAR ECONOMY	Smart waste collection, Smart solutions for the management of waste in the city of the future, Waste recycling and social change, Waste energy recovery in small and big cities, Food waste reduction, E-waste management, New business model, Smart Waste Management and future international Partnership, Smart technologies for the improvement of reuse and recycling, Zero waste cities, etc.
19. WASTE ARCHITECTURE AND URBAN SPACE	Design of facilities for separate collection systems, Vacuum waste collection systems and integration in the urban space, Architecture of Circular Economy facilities (Reuse centres, Ecopoints, Tip shops, Waste Banks, Treatment plants), Recovery of abandoned waste disposal areas, Redesigning Recycling stations, etc.
20. URBAN MINING & CE CONCEPTS IN EMERGING DC's	Economic and technical feasibility under limited financial resources, Appropriate technology, Capacity building, Legal and illegal informal sector issues, Landfill recovery under global South conditions, etc.
21. SOCIAL AND ECOLOGICAL MODELS	Ecotourism (Hotels, cruise ships, touristic places), Informal recycling, Recycling cooperatives, Integrated solutions in MSW management, Recycling networks, Waste picker movements, Social innovations, Grassroots organisations, Community-based recycling, Social valorization, etc.
22. SINKS IN CE	Role of sinks, types of sinks, quality limits for soil sinks, design of soil sinks
23. COMPANIES FORUM	Sorting and treatment technologies, Case studies in Circular Economy and Urban Mining, How to support transition of industrial processes towards circularity, etc. Why companies should have interest in the scientific research? Recruiting top qualified staff / Searching for innovative ideas / Joint research projects, etc.
24. ENERGY & CIRCULAR ECONOMY	Is Energy part of CE? Sustainable energy for CE. Residues from Energy Production; Optimise CE for materials, for emissions, for energy
25. CIRCULAR ECONOMY: COOPERATION BETWEEN ENVIRONMENTAL SCIENTISTS & THE LIVELY ARTS	Potential cooperation with Music, Painting, Sculpture, Music, Photography, Theater, Dance, etc. in the followings sectors: Education, Communication, Joint performances

For further information please contact the Organising Secretariat at info@sumsymposium.it or visit the symposium website: www.sumsymposium.it