

5TH SYMPOSIUM ON URBAN MINING AND CIRCULAR ECONOMY 18-20 NOVEMBER 2020 / VIRTUAL EVENT

industry : sustainability : separate collection : costs : policy : ecopoint : reuse
resources : ciclo della materia : recycling : economy : takeback programs
costs : pollution : materials : legal aspects : costs : collection
takeback programs : case study : filiere del ricircolo : technology : ecopoint
ciclo della materia : recycling : costs : sources : policy : reuse : sustainability
costs : filiere del ricircolo : legal aspects : ecopoint : case study : sustainability
sustainability : technology : industry : policy : ecopoint : reuse : sustainability
filiere del ricircolo : costs : separate collection : costs : industry : separate
collection : ciclo della materia : recycling : ecopoint : pollution : materials
takeback programs : filiere del ricircolo : technology : ecopoint : materials
life cycle analysis : resources : costs : sustainability : industry : costs
sustainability : reuse : ciclo della materia : technology : industry : costs
policy : ecopoint : sustainability : filiere del ricircolo : policy : ecopoint
technology : industry : costs : policy : ecopoint : reuse : pollution
industry : sustainability : separate collection : costs : policy : ecopoint : reuse
resources : ciclo della materia : recycling : economy : takeback programs
collection : costs : legal aspects : costs : collection
takeback programs : case study : filiere del ricircolo : technology : ecopoint
ciclo della materia : recycling : resources : policy : reuse : sustainability
costs : filiere del ricircolo : legal aspects : ecopoint : case study
sustainability : technology : industry : policy : ecopoint : reuse : sustainability
filiere del ricircolo : costs : separate collection : costs : industry : separate
collection : ciclo della materia : recycling : economy : pollution : materials
takeback programs : filiere del ricircolo : technology : ecopoint : materials
life cycle analysis : resources : costs : sustainability : industry : costs
sustainability : ciclo della materia : technology : industry : costs
policy : ecopoint : sustainability : filiere del ricircolo : policy : ecopoint
technology : industry : costs : policy : ecopoint : reuse : pollution
industry : sustainability : separate collection : costs : industry : pollution
materials : legal aspects : costs : filiere del ricircolo : technology : ecopoint
industry : sustainability : separate collection : costs : policy : ecopoint : reuse

SUMM 2020

ORGANISED BY: IWWG . INTERNATIONAL WASTE WORKING GROUP



**SYMPOSIUM PROGRAMME / UPDATED
ON 18/11/2020**

DAY 1 / WEDNESDAY
NOVEMBER 18

WEDNESDAY NOVEMBER 18

12:00-13:00 UTC +1

OPENING SESSION

Chair / *Presidente*: Maria Lavagnolo Lavagnolo (IT)

R. Cossu (IT)

End of waste to close the loop

A. Marangoni (IT)

Circular economy, real economy

S. Caserini (IT)

Climate change: from scientific knowledge to actions

W. Clarke (AU)

Fate of emerging contaminants in circular economy

R. Stegmann (DE)

Some thoughts on circular economy

WEDNESDAY NOVEMBER 18

13:15-14:30 UTC +1

PLENARY SESSION

IWWG CRITICAL REVIEW SESSION: EMERGENCY WASTE AND COVID-19

Chair / *Presidente*: Anders Lagerkvist (SE)

The COVID-19 pandemic has placed considerable pressure on the waste management system and has challenged the Circular Economy, highlighting the already clearly evident contradictions and fragilities of the system. The slowing down of a series of industrial activities and the shutting down of yet others, together with the closure of foreign markets have prevented separately collected wastes from finding an appropriate collocation. This in turn has led to a saturation of storage both in recycling plants and, in some cases, in thermal treatment plants. An inverse situation has been created with regard to medical wastes, which in some contexts have increased three-fold, with the related management being on the verge of collapsing due to the unexpected deluge of volumes to be handled. The most important consequence is that our waste management system can be unprepared and, therefore, it can be necessary to rethink our consolidated beliefs regarding plants in particular, and circular economy in general. The health emergency is not the only emergency that results in a significant variation in the quantity and quality of waste to be disposed of. Developing effective emergency plans for extraordinary waste management, in relation to any possible emergency, is of crucial importance.

Introductory lectures

G. Mondelli, E.R. Silva, C.G. Souza, L.H.S Oliveira (BR)

Perspectives of the MSW management in Brazil after COVID-19

M. Alamgir (BD)

Waste Management in the Emergency Settlements: Rohingya Camps in Cox's Bazar

L. Lombardi (IT)

Covid-19 waste: logistic issues in Tuscany

Roundtable confirmed speakers:

Dezhen Chen, Tsinghua University (CN)

Mohamed Osmani, Loughborough University (GB)

Maria Cristina Lavagnolo, University of Padova (IT)

Aldo Muntoni, University of Cagliari (IT)

Alessandra Polettoni, Sapienza - University of Rome (IT)

WEDNESDAY NOVEMBER 18

14:45-16:00 UTC +1

SESSION A1

IWWG TASK GROUP ON WASTE BIOREFINERY

Chairs / *Presidenti*: Luca Alibardi (GB), Aldo Muntoni (IT)

Keynote speaker:

Luca Alibardi, *Cranfield University (GB)*

Hydrogen in a circular economy

Introductory lectures:

I. Pecorini (IT)

VFA production from pilot scale reactions

A. Polettoni, R. Pomi (IT)

Cheese whey fermentation

L. Lombardi (IT)

LCA applied to cheese whey fermentation

SESSION B1

CIRCULAR ECONOMY FLOWS AT DIFFERENT TERRITORIAL SCALE

Chair / *Presidente*: Daniel Monfort (FR)

D.A. Perozo Suárez, J. Madeira Nogueira (BR)

Integrated waste management in Brasilia: current facts and contributions from circular economy

C. Magrini, G. Biagini, F. Bellaera, L. Palumbo, A. Bonoli (IT)

Evolution of the waste management system in Emilia-Romagna region

C. Matasci, M. Gauch, H. Böni (CH)

How circular are raw material and energy flows in the Swiss economy?

D. Monfort, F. Laurent, B. Rodriguez, S. Muller, J. Villeneuve (FR)

Potential contribution of urban mining to energy transition material needs: the French case study

S. Sacco, M. Cerreta (IT)

Patrimonio plástico: a decision-making process for the reuse of an industrial architecture in Montevideo

WEDNESDAY NOVEMBER 18

14:45-16:00 UTC +1

SESSION C1

ACCOUNTING OF C&D GENERATION

Chair / *Presidente*: Lisbeth Ottosen (DK)

R. Bellopede, L. Zichella, P. Marini (IT)

Waste from extractive and construction sector: regulatory framework according to end-of-waste criteria

L.M. Ottosen, L. Bjerregard Jensen, T.F. Astrup, T.C. McAloone, M. Ryberg, C. Thuesen, S. Lütken, S. Christiansen, A. J. Damø, M. Oddgaard (DK)

Stage of implementation of circular economy in the Danish building and construction sector

A. Mollaei, N. Ibrahim, K. Habib (CA)

The weight of cities: a case study of the region of Waterloo

F. Carollo, L. Rigamonti (IT)

Life Cycle Costing approach for construction and demolition waste management chain: methodology of data collection and organization

F. D'Addato, A. Degli Esposti, A. Bonoli (IT)

A full-cost accounting model for construction and demolition waste management in China and Europe

M. Gutiérrez, R. Kahhat (PE)

Geospatial characterization of urban stock in the residential sector of a high-income district in Peru. A case study of San Isidro, Lima

N.H. Hoang, T. Ishigaki, R. Kubota, T.K. Tong, T.T. Nguyen, H.G. Nguyen, M. Yamada, K. Kawamoto (JP)

Financial viability of concrete waste recycling in Vietnam

WEDNESDAY NOVEMBER 18

14:45-16:00 UTC +1

SESSION D1

CIRCULAR CITIES I

Chair / *Presidente*: Kerstin Kuchta (DE)

As major engines for economic growth, cities can drive the circular economy agenda forward to unlock economic, environmental, and social benefits. Alongside Sustainable Development Goals and climate objectives, the transition to a circular economy will support city leaders as they deliver against their priorities, which include housing, mobility, and economic development. By 2050, two thirds of us will live in cities. However, our urban centers are grappling with the effects of our current take-make-waste economy. Under this 'linear system', cities consume over 75% of natural resources, produce over 50% of global waste, and emit between 60-80% of greenhouse gases. A circular economy provides the opportunity to rethink how we make and use the things we need, and allows us to explore new ways of ensuring long-term prosperity.

The session on Circular Cities will focus on opportunities in three key urban systems - buildings, mobility, and products.

K. Kuchta (DE)

Introductory presentation on circular cities

A. Alassali (DE)

Towards high-quality sustainable plastics

C. Picuno (DE)

Circularity of post-consumer plastic packaging in Germany

Z-K. Chong (DE)

Challenges for the implementation and end-of-life management for bio-based plastics

I. Atamaniuk (DE)

Circularity aspects in the bio economy

L. Francke, S. Löhn (DE)

Integration of circular microalgae bioeconomy into urban space through sustainable management of waste streams

A. Kosheleva (DE)

Exploring possible scenarios for hydrogen-powered mobility within circular economy

J. Bromisch (DE)

Integrating circularity in the built environment

M. Abis (DE)

Innovative approaches for the circularity of MSWI residues

S. Diedler (DE)

The concept of challenged-based learning in the context of circular cities

I. Sohoo (DE)

Environmental sustainability assessment of waste disposal sites in Karachi, Pakistan

WEDNESDAY NOVEMBER 18

14:45-16:00 UTC +1

SESSION E1 / ITALIAN SESSION

STRATEGIE E CRITICITÀ NELL'URBAN MINING E NELLA CIRCULAR ECONOMY

Chairs / *Presidenti*: Chiara Gallani, Maria Cristina Lavagnolo (IT)

F. Peres (IT)

I decreti End of Waste nella legislazione italiana

G. Bortone (IT)

La gestione dei rifiuti durante l'emergenza COVID19 in Emilia Romagna

F. Savini (IT)

ChECK it! - Circular Economy City Kit

G. Tambato, M.C. Lavagnolo (IT)

Esperienza del tavolo GPP della Regione Veneto

SESSION F1

EU PROJECTS - RESOURCES FROM WASTE: ENERGY & MATERIALS I

Chair / *Presidente*: Fabio Poretti (BE)

Dissemination and exploitation are integral part of the European research and innovation funding, and certain obligations in this regard arise even at the project proposal. By sharing their results with the rest of the scientific community, researchers contribute to the progress of science in general. Nevertheless, experience shows it's not always easy to meet these goals. In this regard, the combination of SUM 2020 with the Venice 2020 Symposium provides the perfect stage for dissemination of EU projects focusing on the recovery of waste, both in terms of new materials and energy. During the session selected projects will have the chance to present what they have discovered, how they tackled the challenges they encountered and what are the next research steps in the fields covered by their activities.

J. Rutkowski (GB)

IRS-CESC Project - The role of the informal recycling sector on closing the loops to sustainable cities

M. Smol (PL)

MonGOS - Monitoring of water and sewage management in the context of the implementation of the circular economy assumptions

O. Marzouk (FR)

Apply innovation for the development of circular economy for sustainable construction in the Mediterranean

N. Vincenti (IT)

PolyCE: give a second life to WEEE plastics

A. Castellano (IT)

InnoWEEE: Innovative WEEE traceability and collection system and geo-interoperability of WEEE data

WEDNESDAY NOVEMBER 18

16:15-17:30 UTC +1

SESSION A2

ANAEROBIC DIGESTION

Chair / *Presidente*: Cristopher Eden (GB)

C. Eden, R. Eden, M. Moulden (GB)

Removing ammonia to optimise anaerobic digestion

C. Eden, R. Eden (GB)

Closing the circle: the anaerobic digestion of palm oil mill effluent

C.B. Arenas, J. González, M. Chiappero, S. Fiore, X. Gómez, E.J. Martínez (ES)

Treatment of vinasse and lees by advanced oxidation processes coupled with anaerobic digestion

A. Gallipoli, A. Gianico, S. Crognale, S. Rossetti, M. Masi, V. Piemonte, P. Pagliaccia, C.M. Braguglia (IT)

3-Routes Platform for recovery of high value products, energy and bio-fertilizer from urban biowaste: the REVENUE project

SESSIONE B2

NEWS: MANAGEMENT MEETS ENGINEERING: ADDRESSING CE CHALLENGES TOGETHER

Chair / *Presidente*: Valentina De Marchi (IT)

The interactive workshop, organized by GRONEN (the academic Group for Research on Organizations and the Natural Environment), aims at bringing together participants from engineering, chemistry, business, economics, and other fields to 1) build a common circular economy vocabulary basis, 2) engage in discussions with colleagues from diverse backgrounds and disciplines, 3) learn how circular economy is approached in different disciplines, 4) jointly develop effective research questions to tackle the circular economy challenges, 5) reflect on challenges and opportunities of inter-disciplinary research in the CE realm.

WEDNESDAY NOVEMBER 18

16:15-17:30 UTC +1

SESSION C2

TREATMENT OF C&D WASTE

Chair / *Presidente*: Mohamed Osmani (GB)

Keynote speaker:

Mohamed Osmani, *Loughborough University (UK)*

Circular economy in construction

P. Crowther (AU)

Proposing a new technological paradigm for reuse of construction and demolition waste

A. Diotti, G. Plizzari, S. Sorlini (IT)

Statistical assessment of construction and demolition waste and recycled aggregates leaching behaviour

F. Faleschini, S. Pastore, F. Andreose, A.G. Settimi, K. Brunelli (IT)

Reactivity of industrial waste as supplementary cementing material in cement mortars

P. Stabile, A. Abudurehman, M. Carroll, E. Paris (IT)

Characteristics of C&D waste prior to and after thermal treatments

S. Mukaila Yinka, A. Ocholi, S. Pinder Ejeh (NG)

Valorization of waste tyre in masonry hollow concrete blocks: mechanical characterization

S. Mukaila Yinka, A. Ocholi, S.P. Ejeh (NG)

Dynamic thermal assessment of eco-friendly rubberized masonry hollow concrete blocks

SESSION D2

CIRCULAR CITIES II

Chair / *Presidente*: Kerstin Kuchta (DE)

During session D2, the discussion which previously began in session D1, will continue with the same focus.

WEDNESDAY NOVEMBER 18

16:15-17:30 UTC +1

SESSION E2 / ITALIAN SESSION

ESPERIENZE A LIVELLO LOCALE

Chair / *Presidente*: Lucia Rigamonti (IT)

M.G. Medici (IT)

Impianto di produzione di biometano di Sant'Agata Bolognese (BO)

A. Filippi, G. Cecchini, F. Cammilozzi, E. Miletto (IT)

Il progetto Acea Smart COMP

L. Rigamonti, L. Biganzoli, C. Tua, M. Grosso (IT)

Valutazione dei benefici ambientali della pratica di riutilizzo in Nord Italia di alcune tipologie di imballaggi

V. Squicciarino (IT)

Break even analysis dei processi di recupero delle materie prime e CRM da batterie agli ioni di litio in un'ottica di urban mining e di economia circolare. I casi studio degli impianti dell'America manganese e dell'Accurec

C. Chiavetta (IT)

Urban mining di materie prime e CRM dalle batterie dei veicoli elettrici per la realizzazione di una filiera circolare in Italia

SESSION F2

EU PROJECTS - RESOURCES FROM WASTE: ENERGY AND MATERIALS II

Chair / *Presidente*: Fabio Poretti (BE)

The combination of SUM 2020 with the Venice 2020 Symposium provides the perfect stage for dissemination of EU projects focusing on the recovery of waste, both in terms of new materials and energy. During the session selected projects will have the chance to present what they have discovered, how they tackled the challenges they encountered and what are the next research steps in the fields covered by their activities.

M. Notarfonso, G. Sabbatini (IT)

REINWASTE - REmanufacture the food supply chain by testing INNovative solutions for zero inorganic WASTE

T. Lolos, G. Tavoularis, C. Tsompanidis, G. Konstantinopoulos, L. Streff (GR)

Improvement of Waste Management in Georgia through the application of an effective EPR system for selected products

M. Soto-Herranz, M. Sánchez-Báscones, E. Gómez (ES)

Development of membrane devices to reduce ammonia emissions generated by manure in poultry and pig farms

A. Rimpiläinen (FI)

Biogas for Future Electric and Gas Grids (BIOFEGG)

WEDNESDAY NOVEMBER 18

17:45-18:30 UTC +1

TECHNICAL TOUR

BOLZANO WASTE-TO-ENERGY PLANT

Chair / *Presidente*: Prof. Marco Ragazzi, University of Trento (IT)

Guest / *Ospite*: Dr. Marco Palmitano, General Manager of Eco-center (IT)

The Bolzano waste to energy incineration plant can treat 130,000 tonnes/year of municipal solid waste. The plant recovers the heat produced by the combustion of waste by converting it into steam and by means of this produces thermal and electrical energy. The plant has a total area size of 25000 m², a nominal thermal and electric power of 59 MW and 15 MW, respectively, and a maximum heat output recovery of 32 MW. The calorific value of the treat waste, which is about 13 MJ/kg, allows the production of about 95,000 MWh/year of electrical energy and 240,000 MWh/year of thermal energy. Most of the electricity produced is sold to the national grid, while only a minimal amount is used for plant services. The steam that is not converted into electricity is supplied as thermal energy into the district heating network of the city of Bolzano. The ferrous metals present in the slag are recovered and recycled (2,000 t/year), while the 15,000 t/year of heavy ash, light ash, slag are destined for recovery plants in Italy and abroad.

DAY 2 / THURSDAY
NOVEMBER 19

THURSDAY NOVEMBER 19

11:45-13:00 UTC +1

SESSION A3

NEWS: DIGESTATE MANAGEMENT AND HUMAN HEALTH

Chair / *Presidente*: Alberto Pivato (IT)

One of the main concerns for human health regarding the spreading of biosolids (in particular compost and digestate) on agricultural land is the potential uptake of contaminants into plants which may bio-transfer into grazing animals or directly consumed by humans. The workshop context will contribute to establish a network of experts able to deepen the knowledge about digestate management alternatives, legal aspects, chemical and ecotoxicological characterisation and human risk analysis with the focus on the protection of human health.

A. Pivato (IT)

Human health risk assessment of the use of digestate as soil fertilizer: the case of Veneto Region

SESSION B3

RECOVERY OF RESOURCES FROM DOMESTIC SEWAGE MANAGEMENT

Chair / *Presidente*: Francesco Fatone (IT)

Water is one of the key resources for the full implementation of the circular economy and the circular management of urban water is of particular importance. In this sense, waste water is the category of waste currently least exploited by the circular economy due to legislative, social barriers, economies of scale, standardisation and quality/competitiveness of recoverable resources; and also, maturity, reliability and technological diffusion. The session is an opportunity to present new experiences and to discuss different points of view with the aim to promote a wise water cycle.

F. Fatone, N. Frison, V. Conca, C. Da Ros (IT)

SMART-Plant: validated innovative technologies to recover and valorize materials and energy in existing WWTPS

B.S. Moraes, M.D. Berni, R.A. Lamparelli, P.C. Manduca (BR)

Sewage management into the biorefinery concept: technical potential for bioproducts recovery

C. Pastore (IT)

Urban sewage sludge as a source for biofuels and biolubricants

M. Ferrante, P. Zuccarello, A. Cristaldi, G. Oliveri Conti (IT)

Sewage sludges microplastics content and its contribute on pollution in treated agricultural soils

L. Ekman Burgman (SE)

Making sewage sludge different – The waste-to-resource conundrum in Swedish sewage sludge policy making

THURSDAY NOVEMBER 19

11:45-13:00 UTC +1

SESSION C3

LE MATERIE PRIME PER BATTERIE NELLA TRANSIZIONE VERSO UN'ECONOMIA VERDE: IL NESSO TRA DATI, NORMATIVE E TECNOLOGIA

Chair / *Presidente*: Silvia Grandi - Ministero dello Sviluppo Economico (IT)

La sessione si pone come scopo la presentazione di come la normativa sulle materie prime possa influenzare il passaggio da una economia basata sul fossile ad una economia green. In particolare, si vogliono presentare diversi punti di vista circa problemi e possibili soluzioni.

M.G. Verdura - Ministero dello Sviluppo Economico (IT)

Le materie prime critiche: le politiche europee

W. D'Innocenzo - Rappresentanza Permanente d'Italia Unione Europea (IT)

Politiche Europee nell'ambito delle batterie

F. Forte - ENEA (IT)

Ricerca e sviluppo nel settore delle batterie agli ioni di litio in ottica di Economia Circolare: criticità e prospettive

F. Fumanti - ISPRA (IT)

I giacimenti italiani di minerali per batterie

M. Priori - Cobat (IT)

Una prospettiva privata

THURSDAY NOVEMBER 19

11:45-13:00 UTC +1

SESSION D3

NEWS: IMPORTANCE OF EDUCATION IN CIRCULAR ECONOMY

Chair / *Presidente*: Ian D. Williams (GB)

This session will be run by the IWWG Task Group on Education in Waste Management. There is an emerging and growing societal desire to manage our resources better and to protect the environment, locally as well as globally. Resource management is a multi-disciplinary subject, incorporating: civil, electrical and mechanical engineering; physical, chemical, biological and materials sciences; environmental science and engineering; politics; economics; urban and rural planning; law; industrial ecology; social sciences; media and communications; information technology; advertising; marketing; design; technology; transportation; logistics and operational management; business studies; management; and even the creative arts. Resource management has never had a higher public profile, but its complexity and multi-disciplinary nature means that it is still not properly recognized by a society that continues to under-value its importance to its quality of life. There has never been a more important time to consider the importance of education to resource management. This interactive session will consider methods of addressing this challenge by discussing methods of using education to develop engagement with and raise awareness of resource management with: school-age children; University students and the higher education community; local authorities and the general public.

G. De Feo (IT)

Little life guards: the Greenopli project

R. Dunk (GB)

Educational interventions to improve municipal waste diversion rates

I. Williams (GB)

Greening academia

A.I. Kurbatova, M.D. Kharlamova, M.E. Kupriyanova, A.V. Lukanin, P. Kozhevnikova (RU)

Training highly-qualified personnel in the field of waste management: problems, experience and implementation prospects in Russia

S. Gross (IT)

Towards the master of science in Sustainable Science and Technology for Circular Economy at the University of Padova, Italy

THURSDAY NOVEMBER 19

11:45-13:00 UTC +1

SESSION E3 / ITALIAN SESSION

POTENZIALITÀ E CRITICITÀ DEL LANDFILL MINING

Chairs / *Presidenti*: Daniele Biondi, Giovanni Casadei (IT)

In questa sessione verrà illustrato il processo di landfill mining, metodo innovativo per la gestione dei rifiuti solidi smaltiti in discarica, che associa diverse tecniche ingegneristiche volte all'estrazione e alla valorizzazione dei materiali e/o risorse da rifiuti precedentemente smaltiti. Verrà inoltre approfondito il tema dei costi necessari all'investimento per avviare tale attività. I gap riscontrati dalle simulazioni sulla sostenibilità dell'investimento richiedono inevitabilmente investimenti privati o pubblici o la disponibilità degli enti nella ricerca di nuove aree di destinazione o integrazioni di volumi a quelli dei siti esistenti. Verrà dedicato inoltre uno spazio alla normativa vigente in Italia, in particolare la riclassificazione dei rifiuti estratti dal sito esistente e destinati a valorizzazione o a smaltimento finale in discariche di moderna concezione.

D. Biondi (IT)

La tecnica del landfill mining

G. Casadei (IT)

Normativa vigente in Italia sul landfill mining

R. Cossu, R. Raga (IT)

Esperienze di landfill mining in Italia

SESSION F3

EU PROJECTS SCOUTING SESSION - ARCHITETTURA E PAESAGGIO NELLA CIRCULAR ECONOMY

Chairs / *Presidenti*: Marina Rigillo, Maria Teresa Giammetti (IT)

Il Green Deal, il piano di investimenti della UE, approvato lo scorso 15 gennaio, impegna circa un quarto del bilancio dell'Unione (100 miliardi di euro) per interventi e misure volte a fronteggiare il cambiamento climatico. Obiettivo strategico del Green Deal è fare dell'Europa il primo continente a zero impatto climatico, e a tal fine sviluppare un'economia realmente circolare, promuovendo azioni mirate alla riduzione dei rifiuti e all'incentivazione del riciclo e del riuso. Building and Renovating (costruire e ristrutturare) è infatti uno dei settori di punta del Green Deal, che prevede cicli di produzione edilizia più rispettosi dell'ambiente ed incentiva la riduzione dei rifiuti da C&D.

Il Green Deal orienterà i topics for applications della prossima programmazione Horizon, e gli ultimi bandi da finanziare con i residui della programmazione attuale.

Obiettivo specifico della sessione è la creazione di un network di soggetti competenti e la definizione di temi di ricerca innovativi per partecipare alle call for application di bandi competitivi finanziati con fondi nazionali ed europei.

THURSDAY NOVEMBER 19

13:15-14:30 UTC +1

SESSION A4

RECOVERY OF REFUSE DERIVED FUELS (RDF)

Chair / *Presidente*: Costas Velis (GB)

C. Cord'Homme (FR)

Energy recovery of refuse derived fuel

M. Smol (PL)

Use of residues from waste-to-energy as a way towards circular implementation

S. Petters, K. Mauthner (AT)

Striving for climate neutral hydrogen economy

M. Calero, A. Pérez, Á. Gálvez-Pérez, M.Á. Martín-Lara, G. Blázquez (ES)

Experimental investigation on the air gasification of olive cake at low-medium temperatures

SESSION B4

COMMUNITY BASED SOLUTIONS FOR URBAN MINING AND CIRCULAR ECONOMY

Chairs / *Presidenti*: Maria Cristina Lavagnolo, Cecilia Bruni (IT)

The collaboration between public and private sectors, including companies producing goods and services, is essential for urban mining in view of an effective circular economy. However, the role of the citizens is even more important, at several steps of the life cycle of goods (production, use/reuse and final return to the environment). Although the action of the citizens may be reflected at different scale, it can be particularly effective at small scale, when citizens have a feeling of doing something concrete for their own community. On the contrary, many people feel that their contribution is marginal when considering the waste problem at large scale. The session aims at identifying the actions taken at small scale (residential, city district, etc.) that demonstrate how the will to change one's own surrounding space may serve as driver for a deeper change in society.

M.C. Lavagnolo (IT)

Community based solution for urban mining and circular economy - An overview

C. Bruni, C. Akyol, G. Cipolletta, A.L. Eusebi, F. Fatone (IT)

Current status of decentralised composting in Italy

M. Kalina, M. Ngcoya, B. Nkhoma, E. Tilley (ZA)

Conceptualising reuse in African households: perspectives from Chembe, Malawi

R. Malesani, A. Pivato, S. Bocchi, M.C. Lavagnolo, S. Muraro, A. Schievano (IT)

Compost heat recovery system: a reliable solution for providing thermal energy in rural areas

A. Aicher, M. Boermel, J. Londong (DE)

Development of a living wall system for greywater treatment

N. Mahdjoub, E. Tilley, M. Kalina, A. Augustine, C. Trois (ZA)

'Mining' the village: building with waste glass in Chembe, Malawi

THURSDAY NOVEMBER 19

13:15-14:30 UTC +1

SESSION C4

TEXTILE WASTE AND APPAREL

Chair / *Presidente*: Andreas Bartl (AT)

Continuous increase of fibre and textile production is accompanied by an overall decrease in useful life and by environmental impacts. The amount of textile waste is large, with a rather non-uniform material stream, featuring mixtures of various origin, and recycling can be complicated. The session is an opportunity to discuss the limitations of recycling approaches, to introduce new methods for recycling and for new materials production, to explore the trade of second-hand clothing.

Keynote speaker: Edith Ipsmiller, *Vienna University of Economy and Business (AT)*

Circular economy in the global textile industry from an economic and business perspective

A. Bianchini, P. Guarnieri, J. Rossi (IT)

Assessing social sustainability in a circular model: application in an Italian luxury footwear industry

S. Paixão, S. Kalambura, J. Figueiredo, A. Ferreira, S. Pedro (PT)

Fast fashion and circular economy: comparison between Portugal and Croatia

G. Braun, R. Hischer (CH)

Closing the textile loop – The wear2wear approach

SESSION D4

STRATEGIES AND DECISION MODELS IN CIRCULAR ECONOMY

Chair / *Presidente*: Marco Ritzkowski (DE)

L. Ciacci, I. Vassura, F. Passarini (IT)

Potentials for GHG emissions reduction in the circular economy: the anthropogenic copper cycle

J.E. Rutkowski (GB)

Inclusive packaging recycling systems: improving sustainable waste management for a circular economy

D. Camana, A. Marson, A. Manzardo, A. Scipioni (IT)

Environmental management tools to reduce production and consumption by citizens

E. Tam (CA)

Describing circular economy using corporate sustainability reporting

A. Campitelli, J. Kannengießer, L. Schebek (DE)

Assessment of waste management systems, worldwide: a systematic literature research

P. Guarnieri, A. Bianchini, J. Rossi (IT)

The institutionalization of the transition towards a circular economy: a comparison between Italy and Brazil

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SESSION E4 / ITALIAN SESSION

WASTE ARCHITECTURE: LE INFRASTRUTTURE PER LA GESTIONE SOSTENIBILE DEI RIFIUTI NELLA CIRCULAR ECONOMY

Chairs / *Presidenti*: Elena Cossu, Anna Artuso (IT)

Questa sessione è stata concepita per evidenziare l'importanza che rivestono le opere infrastrutturali per la gestione e lo smaltimento dei rifiuti (intese come insieme di reti e nodi costruiti) nel perseguimento degli obiettivi della Circular Economy. La sessione si occuperà degli aspetti architettonici e progettuali dei nuovi modelli di gestione rifiuti nello spazio urbano concepiti nell'ottica di superare definitivamente la criticità del sistema e trasformarlo in una reale opportunità per il territorio, sia sotto il profilo della riduzione delle tariffe (applicate dai gestori degli impianti e dei servizi) sia sotto l'aspetto della creazione di valore (sociale e ambientale) ed indotto.

E. Cossu, A. Artuso (IT)

Opere infrastrutturali e nuovi modelli per la gestione sostenibile dei rifiuti nella circular economy. Overview e principi ispiratori per un corretto approccio al riuso

S. Sacco, M. Cerreta (IT)

Patrimonio plástico: un processo decisionale per il recupero di un'architettura industriale a Montevideo, Uruguay

L. Nicoletto (IT)

La dimensione territoriale di approcci circolari nel settore delle costruzioni. Riflessioni a partire da un cantiere di uno spazio pubblico nella regione Veneto

SESSION F4

COMPANIES FORUM

Chair / *Presidente*:

The primary goal of the forum is to create a balance in the event between the scientific content and the industry contributions, in order to foster exchanges between practitioners and the academics, and promote novel solutions to today's challenges in the area of waste management and circular economy. Companies and startups will have the chance to present their own products and services. Ample time will be allowed for discussion and networking.

Confirmed companies and start up:

Benjamin Varese: Recy Smart Solution

Christian Torri (IT): B-PLAS

The challenge of B-PLAS project is focused on innovative biotechnology for the treatment and reduction of different kind of sewage sludge, such as waste sludge produced by food & beverage companies and the sludge derived from the utility and multi-environment utilities operating in waste management.

A. Forestan (IT): Spirit Srl / Battery Recycling

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SESSION A5

DIRECT TEST METHODS FOR THE CLASSIFICATION OF HAZARDOUS PROPERTIES OF WASTES

Chair / *Presidente*: Alberto Pivato (IT)

Correct hazard classification of waste is crucial to provide sustainable and lawful management plans, from transport to final disposal. Especially in the case of waste classified as “mirror entry” in the European List of Waste, the choice of the specific assessment tool or method is a key step to ensure the transparency and reliability of the process. Directive 2008/98/EC defines waste as hazardous if characterized by at least one of the 15 hazardous properties (HPs). The assessment of the specific HP can be based on the measured content of potentially hazardous substances or on the result of a test of a given property. Here, a tiered assessment is recommended:

- 1st tier: Waste should be classified according to the European List of Waste (LoW) as “hazardous”, “non-hazardous”, or as “mirror entry”. In this latter case:
- 2nd tier: Some HPs can be assessed as through the so-called expert judgment;
- 3rd tier: The remaining HP can be assessed according to the total concentration of specific waste constituents under a “worst realistic case” hypothesis.
- 4th tier: If the “worst realistic case” approach leads to unsatisfactory or unrealistic results, a 4th tier can be performed by carrying out direct analytical methods, specifically developed for the target HP. In this context, the session will discuss the current drawbacks and challenges posed by the current direct test procedures implemented in the 4th tier. In particular, the following Hazard Properties will be debated, being identified as the most discriminating or controversial ones: HP 4 Irritant; HP 8 Corrosive; HP 10 Toxic for reproduction; HP 14 ecotoxic.

P. Hennebert (FR)

Waste hazard properties HP 4 ‘Irritant’ And Hp 8 ‘Corrosive’ By Ph And Acid / Base Buffer Capacity

L. Maggi (IT)

Classification of waste: state of the art of direct testing and later challenges in the Italian scenario

S. Giardina (IT)

HP10 Classification of waste: experimental strategies by in vitro testing approach

P. Grenni (IT)

Ecotoxicological testing for HP14 Classification of Waste: state of the art and current challenges

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SESSION B5

BLUE ECONOMY SOLUTIONS FOR SUSTAINABLE CIRCULAR ECONOMY AND ROLE OF BLACK SOLDIER FLY

Chair / *Presidente*: Valentina Grossule (IT)

Complex systems, used in both solid and liquid waste management and treatment, might result not always affordable, particularly due to high costs and high technology needed. The interest for developing innovative sustainable treatment techniques is growing worldwide favouring the application of concepts such as the Blue Economy concept (Gunter Pauli, 2004). This concept aims to find solutions inspired by nature, trying to move from environmental problems to opportunities of business and innovation. Blue technologies should be simple, cost-effective and should allow recovering viable resources in terms of energy and material. Examples that will be introduced in this session, are related to: Use of Black Soldiers Fly (BSF) larvae for biowaste treatment, Phytotreatment using energy crops, Thermocompost. Other contributions are welcome in order to promote new fruitful collaboration and discussion.

V. Grossule (IT)

Blue economy solutions for sustainable circular economy and role of Black Soldier Fly - An overview

Keynote speaker: **Huang Yongping**, *Shanghai Institute for Biological Sciences (CN)*

Black Soldier Fly traits and organic waste based circular economy

M. Gold, D. Ileri, C. Zurbrügg, T. Fowles, A. Mathys (CH)

Efficient and safe substrates for Black Soldier Fly biowaste treatment along circular economy principles

SESSION C5

MANAGEMENT OF PLASTIC SOLID WASTE

Chair / *Presidente*: Susan Thorneloe (US)

Keynote speaker: **Nina Butler**, *MORE Recycling (US)*

Transition from to a circular economy using life cycle tools to evaluate End of Life technologies

M. Calero, M.Á. Martín-Lara, A. Pérez, G. Blázquez, M. Muñoz, S. Arjandas, E. Lozano (ES)

Plastic mix recycling from municipal solid waste: characterization of raw material

G. Bonifazi, R. Gasbarrone, S. Serranti (IT)

Detecting contaminants in post-consumer plastic packaging waste by a Near InfraRed HyperSpectral Imaging-based cascade detection approach

L. Rigamonti, L. Biganzoli, C. Tua, M. Grosso (IT)

Life Cycle Assessment evaluation of the reuse of some types of packaging

I.D. Williams (GB)

Child's play: the horror of toy waste in the UK

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SESSION D5

MINIMIZATION AND ECODESIGN

Chair / *Presidente*: Laura Badalucco (IT)

According to EU waste hierarchy, waste minimisation should play the most important role in waste management. The role of minimisation is, so far, small and the way to measure it is still unclear. Several strategies could be adopted to avoid or reduce the waste generation at the source, monitoring both the quantity and the quality. The strategies can be implemented at different steps of the life cycle of the products, the “eco-design” might represents an important tool to produce goods which should be long lasting, easy to be repaired/reused, free of any hazardous substance, etc. This session aims at address the critical points and the opportunities within the concepts of prevention and eco-design.

SESSION E5

FOOD AND ORGANIC WASTE

Chair / *Presidente*: Christian Zurbruegg (CH)

Keynote speaker: Christian Zurbrügg, *Eawag (CH)*

Experiences with Black Soldier Fly biowaste treatment in Indonesia

G. Dolci, L. Rigamonti, M. Grosso (IT)

Influence of the type of collection bag on the food waste treatment chain: a life cycle assessment

M.K. Manu, W. Chen, J.W.C. Wong (HK)

Effective composting strategies for ammonium enriched food waste digestate

M. Casa, M. Miccio, G. De Feo, A. Paulillo R. Chirone, D. Paulillo, P. Lettieri, R. Chirone (IT)

A brief overview on valorization of industrial tomato by-products using the bio-refinery cascade approach

I.D. Williams (GB)

Timber! Recovering value from wood waste in the UK

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SESSION F5

MEET THE EXPERT: RISCHIO INCIDENTE NEGLI IMPIANTI PER LA PRODUZIONE DI ENERGIA DA BIOMASSE E RIFIUTI

Chair / *Presidente*: Vincenzo Torretta (IT)

Biomasse e rifiuti sono una fonte rinnovabile di energia le cui caratteristiche principali sono: 1) essere intrinsecamente legate al territorio, sono infatti disponibili ovunque e largamente diffuse; 2) essere uno degli strumenti indicati per la riduzione delle emissioni di gas serra in atmosfera: il bilancio della CO₂ relativo alla conversione delle biomasse e dei rifiuti in energia è considerato neutro. Proprio per la loro diversità sono disponibili numerose tecnologie di conversione che producono altrettante forme finali di energia: energia elettrica (e/o termica), combustibili liquidi, biogas, gas di sintesi, ecc.

Tuttavia, le tecnologie attualmente disponibili per la conversione di biomasse e rifiuti in forme utili di energia comportano delle criticità dal punto di vista dell'operabilità degli impianti e della salute dei lavoratori in essi impiegati. Pertanto, anche per queste tipologie di impianto, non è possibile trascurare la conduzione di un'accurata valutazione dei rischi. Tecniche di identificazione dei pericoli universalmente accettate quali l'HAZOP risultano però troppo dispendiose sia in termini di denaro, sia di personale impiegato, sia di tempo dedicato all'analisi stessa. Inoltre, non risultano prettamente mirate alla tipologia di impianto in analisi. In questo lavoro verrà perciò presentata l'applicazione di una tecnica di identificazione dei pericoli, chiamata Analisi di Operabilità Ricorsiva Avanzata (AORA), che, accoppiata con altre note tecniche di qualificazione dei modi di guasto (FMEA) di un impianto e di quantificazione della probabilità di accadimento di eventi incidentali (Albero dei Guasti o FTA), permetterà sia di condurre un'analisi di rischio completa sia di identificare le aree ATEX attorno alle apparecchiature in modo automatico.

La tecnica AORA è stata applicata a titolo esemplificativo a due differenti processi di valorizzazione delle biomasse e dei rifiuti: 1) un processo di gassificazione di rifiuti e, 2) un processo di produzione di biogas (mediante gasometro e fermentazione anaerobica di reflui animali). I risultati hanno evidenziato, attraverso limitati sforzi di analisi, le principali criticità di queste due tipologie di impianto rendendo inoltre molto semplice e strutturata l'eventuale identificazione delle zone ATEX attorno alle apparecchiature.

Vincenzo Torretta is Associate Professor at the University of Insubria (Varese, Italy). His work focuses on air pollution control technologies, waste treatment and energy recovery and environmental impact assessment. He has been author and co-author of several ISI/Scopus-indexed publications.

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PLENARY SESSION

BALANCED WASTE MANAGEMENT IN CIRCULAR ECONOMY (MINIMIZATION, RECYCLING, THERMAL TREATMENT AND SUSTAINABLE LANDFILLING)

Chair / *Presidente*: Jurate Kumpiene (SE)

Introduction by Raffaello Cossu

The first day of the Solid Waste Management course I teach at the University of Padua, Italy, I usually ask the students a simple question: "In your opinion, which is the best system of waste management?" Their immediate reply, in chorus and with very few exceptions, is: "Recycling!" I then go on to the second question: "In your opinion, which is the best means of transport?" After a moment of bewilderment due to this abrupt jump from one topic to another, no response is forthcoming until the first brave person breaks the ice: "It depends!" I ask for an explanation and immediately receive a clear, logical justification. Everyone agrees that it is reasonable to think that to go from Paris to Beijing by car or by train may be nostalgically romantic, or at least adventurous, but it is much more practical to fly there. On the contrary, it would, to say the least, be totally absurd, or even grotesque, to think of catching a plane to go to buy the bread! We further developed the discussion by mentioning how, for reasons of practicality, we rarely use the same means of transport all the time. We walk to the garage to get the car. We use the car to get to the airport. Here we board a plane and, on leaving the plane we may indeed catch a train or take a boat, or.....

I then ask my third question: "Why do you reply «it depends» when referring to means of transport, taking into account your requirements at the time and the context in which you are placed, whilst giving such a decisive answer when focusing on waste management?"

I then go on to ask a fourth question: "Why did it not occur to you to combine the different methods of waste treatment and disposal?" Indeed, in the same way that means of transport are largely diverse, the field of waste management affords a series of well-differentiated options, as follows (minimization of waste generation; recovery and recirculation of material resources present in the wastes; combustion of waste with the main aim of reducing waste volumes; landfilling of residual wastes in order to close the material loop).

It is undeniable that, in the same way as transportation these solutions must be combined and integrated. On analyzing the disposal techniques adopted worldwide, it is clear that countries characterized by a high population density (e.g. Japan, Singapore, Denmark, Germany, etc.) benefit enormously from the use of incineration combined with intense programs for the recovery of material resources (sorting, recycling, biological treatment) and with landfilling of residual wastes. At the same time, countries with a low population density prefer to combine waste recycling with landfilling (e.g. Canada, United States, etc.).

We are well aware that all waste management technologies, ranging from composting to landfill, and from mechanical treatment to incineration, are characte-

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alized by the emission of contaminants that should be, wherever possible, prevented and rigorously monitored. Even the recovery and recirculation of waste materials results in the accumulation of a series of contaminants contained in the materials, and are certainly not devoid of negative environmental impacts. However, on taking a closer look, the various means of transport do not fare too well in the field of emission of contaminants and environmental risks. (...) Of course the available technologies are in a position to strongly attenuate the pollution and risks lined to means of transport, but the same is true also for waste management systems. If a bridge or a house collapses, we do not stop building houses and bridges! We build them with the best sustainable technologies!!!

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The aim of this session is to kick start discussion among scientists with expertise in different aspects of waste management, of potential controversies for the purpose of clarifying the issues involved in the hope of reaching a mutual conclusion.

This is a new session format geared toward stimulating discussion and insight, whilst distancing people from a so-called “football supporters” approach, in which waste management options are often seen as irrational alternatives, in the same way as the teams in a football championship.

The panel of experts is as follows:

- Jurate Kumpiene, Luleå University of Technology (SE) / Moderator
- Raffaello Cossu, University of Padova (IT)
- Andreas Bartl, TU Wien (AT)
- Jianhua Yan, Zhejiang University (CN)

DAY 3 / FRIDAY
NOVEMBER 20

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11:45-13:00 UTC +1

PLENARY SESSION

SINGLE USE PLASTICS: TRANSITION TOWARDS THE FUTURE

Chair / *Presidente*: Alessandra Bonoli, Maria Cristina Lavagnolo (IT)

Marine littering and plastic waste prevention have been and are among the priorities of EU policies in recent years. The urgency of measures' adoption to promote plastic waste prevention is evident. Plastic use, and mainly single use plastic, is subject to a new debate and there is a clear contrast between the drive to reduce the use of disposable plastic and the spread of SUP because of health and sanitary safety issues. From one side, a robust reduction of plastic products and plastic waste, advocated by many because of the dramatic consequences for health and environment, has been encouraged by the EU plastic strategy and other European regulations during the past three years. From the other side, it is considered necessary to increase plastic goods' use, like during these months and as perhaps for years to come: concern about safety and cross-contamination has caused statewide, municipal and corporate repeals of single-use plastic bans, and this has been translated into a heightened demand for bottled water, PPE, plastic bags and packaging. The pandemic has slowed down the implementation of plastic replacement and prevention. Bioplastics is also an important topic. Are bioplastics ready to replace fossil fuel-based plastic products in some sectors? It is of utmost importance to define the targets and to design a transition that avoids shortage or critical reduction of turnovers and jobs for plastic value chain companies, guaranteeing both worldwide environmental and health protection.

Roundtable confirmed speakers

Alberto Bellini, *Università di Bologna (IT)*

Carmine Pagnozzi, *Assobioplastiche (IT)*

Henning Wilts, *Wuppertal Institute (DE)*

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SESSION A6

MANAGEMENT OF RESIDUAL WASTE FROM CIRCULAR ECONOMY

Chair / *Presidente*: Raffaello Cossu (IT)

C. Cord'Homme (FR)

Circular economy and resource management: Energy-from-Waste is a sustainable pillar

V. Cieri, A. Cesaro, F. P. Buonocore, R. Manzi, M. Bruno, V. Belgiorno (IT)

State of the art of the management of residual waste bales in Campania region

C. Soares de Morais, T. Rodrigues Pereira Ramos, A.I. Cerqueira de Sousa Gouveia Carvalho, A.P. Barbosa-Póvoa, M.T. Da Cruz Carvalho (PT)

Planning the logistics network of a processing system for packaging glass recovery from undifferentiated urban waste

U. Kalbe, C. Vogel, F.-G. Simon (DE)

Antimony in incineration bottom ash - Leaching behavior and conclusions for treatment processes

SESSION B6

NEWS: PARTICIPATION AND SUSTAINABILITY IN CIRCULAR ECONOMY

Chair / *Presidente*: Mark Kalina (ZA)

The phenomena of socio-environmental disputes related to the design and construction of waste treatment plants, very often simplified as NIMBY syndrome ("Not In My Back Yard"), are still numerous. The forms of participation in such cases raise important questions: how do we define involved communities? How to manage participatory inclusive processes? How to define and measure the representativeness of a committee or a protest movement, claiming the right to dispute decisions of collective importance? At what point in the decision-making process is it necessary to involve citizens and how? What instruments already in the legislation need to be stressed or corrected for the optimal implementation of the circular economy? The session is a call to collect experiences at international level and to amplify the debate on a subject that continues to be controversial and challenging.

M. Kalina, E. Tilley, C. Trois (ZA)

Saving, ignoring, 'trashing': reflections on 'seeing waste scenarios' from Blantyre, Malawi

L. Kujanpää, H. Pihkola (FI)

A participatory approach for addressing challenges in waste collection

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SESSION C6

STRATEGIES AND RESOURCES FROM INDUSTRIAL WASTE

Chair / *Presidente*: Kaimin Shih (HK)

A. Zannella, G. Legnani, N. Vincenti, L. Campadello (IT)

The challenge of NONTOX: removing hazardous substances to increase the recycling rates of WEEE, ELV and C&DW plastics

H. Ayoub, E.M. Cherkaoui, D. Allal, I.-K. Saâd, F.-M. Abdelkarim, M. Abdelmajid, A. Soumia (MA)

Characterization of phosphate sludge and its benefits as a natural fertiliser for African poor soils

H. Fantucci, M.F. Aguirre Matheus, R.M. Santos (CA)

Wet oxidation of grape pomace: towards production of GHG-neutral soil amendment

Y. Zhou, K. Shih, C. Liao (HK)

Combine iron oxide and calcium carbonate additives to immobilize Pb in cathode ray tube funnel glass

P.S. Camargo, A.S. Domingues, J.P. Guê Palomero, A.C. Kasper, P.R. Dias, H. Veit (BR)

Crystalline silicon photovoltaic module recycling: materials separation by thermal degradation

SESSION D6

STRATEGIES IN WEEE MANAGEMENT I

Chair / *Presidente*: Pierre Hennebert (FR)

R. Brüning, H. Tien, J. Wolf (DE)

The revised guideline VDI 2343 supports the concerned parties regarding the treatment of waste electrical and electronic equipment (WEEE)

G. Bonifazi, G. Capobianco, R. Palmieri, S. Serranti (IT)

Recycling oriented characterization of printed circuit boards from mobile phones by micro X-ray fluorescence

L. Herrera, D.A. Riaño, C. Cañón, R. Mejía, V. Torres, M.F. Vargas, A. Uribe (CO)

Comprehensive waste management plan for small electrical and electronic devices

M. La Monica, C. Scagliarino, F. Nania, G. Massacci, L. Cutaia (IT)

Raw materials and CRMs in lithium-ion batteries for electric vehicles: analysis of value chains from a circular economy perspective

C. Battellini, S. Zuin, M. Celotto, A. Pivato, M.C. Lavagnolo (IT)

Assessment of product-related criteria in the calculation of a reparability index: a case study on washing machines

P. Hennebert (FR)

Some data on the massive substitution of regulated brominated flame retardants in plastic products and waste

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SESSION E6

NEWS: RECODING INFRASTRUCTURE

Chair / *Presidente*: Paolo Carli (IT)

The contemporary city is dotted with large infrastructure that allows its accessibility and operation. Today, roads, railways, bridges, overpasses, underpasses, parking lots, but also service stations, sewages and telecommunications networks, form the very backbone of the city, often more than squares, roads and markets. These categories of infrastructure with a strong perceptual and environmental impact are considered alienating from the inhabitants and generating segregation, iniquity of the access to urban services and terrain vagues, unfriendly and insecure spaces, often left in total abandonment. Static and unchanged over the years, these mono-functional artefacts require a new critical approach inside the city regeneration agenda. The effects of climate change, the urban heat island phenomenon, the air pollution, the population density increasing due to migratory movements, the cost of materials and the scarce accessibility of resources, impose a change in the programming codes of the urban areas that involve directly the infrastructure. Using as case study the research UNPark, funded by the social engagement and responsibility programme Polisoocial 2019 of the Politecnico di Milano, the Network Session proposes a critical analysis of the processes in progress to collect and learn about new tools that allow to frame these changes in a wider picture of urban transformation, which takes into account the social aspects of the re-signification of public heritage.

P. Carli, P. Scrugli (IT)

Recoding urban infrastructure

D. Crippa, B. Di Prete, E. Lonardo (IT)

The many ways of plastic: technological innovation as a driver of urban regeneration

D. Crippa, E. Lonardo, A. Rebaglio (IT)

The "RE" Factor: re-cycle, re-use, re-think

M. Clementi (IT)

From waste to locally sourced building materials for a prosuming community

C. Monticelli (IT)

The life cycle design of textiles for urban architectures: their potentials as reused/reusable solutions and as mitigation solutions

SESSION F6

POSTER DISCUSSION I

Chair / *Presidente*:

Three poster discussion hubs will be held during the symposium, where poster presenters and other delegates can meet, network and discuss the poster topics and findings. Poster discussions will be highly interactive sessions structured according the format below: - Live introduction from the chair - Authors will have 8 minutes to present their poster - Live Q&A session to provide additional information, highlight key points and answer questions.

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SESSION A7

LANDFILL MINING

Chairs / *Presidenti*: Roberto Raga (IT)

Landfill Mining has gained increasing attention in recent years, due to its potential in circular economy strategies. Several different approaches and different technologies for processing excavated waste are available. However, the economic feasibility of full scale applications is still the bottleneck for the valorization of landfilled waste as materials and/or energy and most reported case studies refer to the simple excavation and further deposit in new landfill sectors. Research projects are being carried out with the aim of developing cost effective technologies for the application of LFM for resource recovery. Goal of this session is to present the state of the art in Landfill Mining research.

P. Rabelo Monich, D. Desideri, R. Murillo Alarcón, G. Sauve, H. Lucas, B. Friedrich, K. Van Acker, Y. Pontikes, D. Vollprecht, E. Bernardo (IT)

Key lessons for valorization of inorganic residues in enhanced landfill mining

A. Ghosh, S.A. Kartha (IN)

Assessment of feasibility and viability of landfill mining of open dumpsite in India

M. Somani, M. Datta, G. V. Ramana, T. R. Sreekrishnan (IN)

Geoenvironmental evaluation of landfill mining at open dumps in India

M. Kriipsalu (EE)

Dynamics of groundwater quality during full scale landfill mining

G.M. Cappucci, R. Avolio, C. Carfagna, M. Cocca, G. Gentile, S. Scarpellini, F. Spina, G. Tealdo, M.E. Errico, A.M. Ferrari (IT)

Mechanical and environmental suitability of secondary plastic from landfill mining

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SESSION B7

NEWS: E-WASTE MANAGEMENT BEHAVIOURS

Chair / *Presidente*: Ian D. Williams (GB)

Waste electrical and electronic equipment (WEEE or e-waste) comprises a globally important waste stream due to the scarcity and value of the materials that e-waste contains; annual generation is increasing by 3-5% per annum. The effective management of e-waste will contribute significantly to progress towards circular economy ambitions and resource efficiency, including reducing carbon emissions. All sectors of society have roles in enabling this transition but it cannot occur without active public participation. However, because so many factors influence waste generation, finding mechanisms to engage and motivate the public towards effective e-waste management behaviours is hugely challenging. This interactive session will consider methods of addressing this challenge by discussing methods of: developing engagement with the public (including school-age children), local authorities, retailers, manufacturers, industry, government and journalists; raising awareness of the social/environmental impacts of e-waste to stimulate behaviour change, working with young adults to encourage reuse of used, unwanted electrical and electronic equipment.

I. Williams, A. Brock, R. Browning, A. Campanie, S. Pal (GB)

The TRACE project

L. Shittu, P. Shaw, I. Williams, N. Montiero, R. Creffield (GB)

WEEE donate: charity begins at halls

F. Duarte Castro, B. Gomes Xavier, B.M. Penha Perpétuo, J.A. do Carmo Cardeal,

L. Gomes Lopes, R. França Furtado, M. Vaccari, L. Cutaia (IT)

Consumer behaviour and awareness: a case study on reverse logistics of batteries in Vale Do Aço, Brazil

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SESSION C7

RECOVERY OF MATERIALS FROM THE URBAN WATER CYCLE

Chair / *Presidente*: Dongbei Yue (CN)

J. Sansalone (US)

Valorization of urban particulate matter recovery for nutrient load credits

S. Hörnlein, S. Mehling, J. Londong (DE)

Communicating source separation of urine

X. Dong, D. Yue (CN)

Preparation of high-performance magnetic humus by abiotic humification method for Cr(VI) removal

P. Schyns (NL)

Kaamera Nereda® gum: a biobased polymer extracted from granular sludge with unique applications

SESSION D7

STRATEGIES IN WEEE MANAGEMENT II

Chair / *Presidente*: Julia Wolf (DE)

C.F. Gomes, M. Ottoni, L.H. Xavier (BR)

Traditional mining and urban mining: aspects of e-waste management in Brazil

R. Araujo, J. Cugula, L. Apolonio, M. Ottoni, L.H. Xavier (BR)

Spatial distribution analysis of e-waste Voluntary Delivery Points (VDP) by Green Electron manager in São Paulo city (SP, Brazil)

R. Araujo, M. Ottoni, L. H. Xavier (BR)

Analysis of e-waste voluntary delivery points (VDP) location in the city of Rio de Janeiro, Brazil

J. Cugula, L. Apolonio, R. Araujo, M. Ottoni, L. H. Xavier (BR)

E-waste hotspots and best routes analysis for reverse logistics in the city of São Paulo, Brazil

X. Pierron, I.D. Williams, P.J. Shaw (GB)

E-delphi and behavioural economics for mobile and smart phones end-of-use collection

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SESSION E7

CIRCULAR ECONOMY THROUGH THE LENS OF INCLUSIVE RECYCLING: A GLOBAL NORTH-GLOBAL SOUTH DIALOGUE

Chairs / *Presidenti*: Jutta Gutberlet (CA), Sebastian Carenzo (AR)

This workshop will bring different perspectives from academics and practitioners on the circular economy, with practical examples from the global South and the global North. The concept of Circular Economy (CE) proposes a critical rethinking of the linear model of extraction-production-consumption-disposal that is predominant under the current local and global techno-productive regimes. Thus, it focuses on minimizing the impacts of human activities on nature, by reducing the extraction of the natural resource base, as well as by extending the life cycle of already transformed material stocks. By considering design as a key driver, the CE approach on waste management is not limited to increasing the recyclability of materials, as it targets waste prevention by optimizing the consumption of raw inputs. Thus, the design of a zero-waste productive process is considered one of its most compelling challenges. However, we must take into account that currently up to 2% of world population makes a living from collecting and sorting materials from waste. Specially in global South countries, informal recycling is responsible for diverting between 10-20% of discarded materials from household and industrial waste streams avoiding those materials to end up in final disposition facilities. In this sense, waste picker organizations together with scholars and social movements have been working towards an inclusive recycling perspective, to be formalized and included into the official waste management systems in middle and large urban agglomerations. From this perspective, Circular Economy is basically considered a way to enhance the recyclability of waste, without necessarily conceiving a zero-waste future. The unique attention the Circular Economy is currently getting in the public agenda, is seen by waste picker organizations as an opportunity to achieving the social and economic recognition they deserve, but which is still denied for most of them.

SESSION F7

POSTER DISCUSSION II

Chair / *Presidente*:

Three poster discussion hubs will be held during the symposium, where poster presenters and other delegates can meet, network and discuss the poster topics and findings. Poster discussions will be highly interactive sessions structured according the format below: - Live introduction from the chair - Authors will have 8 minutes to present their poster - Live Q&A session to provide additional information, highlight key points and answer questions.

FRIDAY NOVEMBER 20

16:15-17:00 UTC +1

TECHNICAL TOUR

DISMECO TREATMENT PLANT

DISMECO Srl is a company specializing in the treatment and disposal of waste electrical and electronic equipment (WEEE), which operates as part of an environmental project that has among its cornerstones process excellence for maximum recovery of materials and the total regulatory compliance.

Besides industrial and technical activities, the company carries out also educational activities and research projects, collaborating with environmental associations.

Their Borgo Ecologico® project, unique in its kind, operates as a multi-platform where industrial activity takes place along with the production of clean energy thanks to state-of-the-art photovoltaic technologies.

In this place Dismeco carries out:

- activities aimed at maximum recovery of raw materials;
- educational activities for schools, in order to effectively show students the actual phases connected to the recycling processes of electrical and electronic waste;
- collaborations with Universities, such as that of Bologna or Modena-Reggio Emilia;
- participation in international projects, such as the European Project Relight in collaboration with the Chalmers University of Technology in Goteborg and a pool of European companies;
- collaboration with the Penitentiary Institutes of Emilia Romagna for the education of prisoners who deal with WEEE dismantling as part of the activities typically carried out in these Institutes.

Dismeco Srl has been operating in Marzabotto (Bologna, Italy) since November 2010 with the most modern treatment systems.

One particularly innovative plant is their highly automated handling and pre-selection system - totally engineered by Dismeco - which allows to intervene on WEEE equipment by extracting the significant components "before" shredding, unlike most traditional systems, through a selective separation process of the different plastic and metal materials, thus allowing for an optimal recovery.

Dismeco also has two other treatment plants, the first for monitors, the second for fluorescent lamps: both plants carry out the recovery of glass and other connected components, with separation of harmful substances, represented by fluorescent powders.

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VISITA TECNICA

IMPIANTO DISMECO

DISMECO Srl è un'azienda specializzata nello smaltimento e trattamento di materiale elettrico ed elettronico (RAEE), ricercandone la massima resa in termini di materie prime tramite le soluzioni tecnologiche impiantistiche più appropriate per ciascuna tipologia.

Dismeco cura in modo particolare la conformità e l'aggiornamento rispetto a tutte le leggi italiane ed alle raccomandazioni della Comunità Europea in ambito di gestione dei rifiuti, basando su ciò la qualità dei servizi resi ai propri clienti, che sanno di poter contare su un interlocutore unico e qualificato nella gestione di tutti i passi del "fine vita" delle proprie apparecchiature elettriche ed elettroniche.

Progetto Borgo Ecologico®

Il progetto, denominato "Borgo Ecologico"® si colloca fisicamente nell'area dell'ex "Cartiera Burgo" di Lama di Reno - già "Cartiera della Lama" - esistente da secoli; dei 100.000 mq di questo sito industriale Dismeco occupa oltre un terzo della superficie, avendo ristrutturato completamente un'area che era del tutto dismessa, preservandone il contesto strutturale ed architettonico originario. Unico nel suo genere, il "Borgo Ecologico" opera come multipiattaforma in cui, oltre al trattamento di quasi tutte le tipologie dei RAEE, si produce energia pulita con l'impiego di energie rinnovabili, come l'impianto fotovoltaico di ultima generazione da 1 MW di potenza di picco.

In questo luogo si svolgono:

- *attività progettuali rivolte al massimo recupero e valorizzazione di materie prime;*
- *attività didattiche per le scuole, per mostrare fattivamente agli studenti le effettive fasi connesse ai processi di riciclo dei rifiuti elettrici ed elettronici;*
- *collaborazioni con le Università, come quella di Bologna o di Modena-Reggio Emilia;*
- *aperture verso progetti internazionali, come la partecipazione al progetto europeo Relight in collaborazione con la Chalmers University of Technology di Goteborg ed un pool di aziende europee;*
- *collaborazione con gli Istituti Penitenziari dell'Emilia Romagna nell'istruzione e nell'operatività dei detenuti che si occupano di smontaggio RAEE nell'ambito delle attività tipicamente svolte in questi Istituti.*

Dismeco Srl opera a Marzabotto (BO) dal novembre 2010 con i più moderni sistemi di trattamento.

Particolarmente innovativo risulta un impianto di movimentazione e preselezione a forte automazione - totalmente ingegnerizzato dalla Dismeco - che consente d'intervenire sulle apparecchiature RAEE estraendone le componenti significative "prima" della triturazione, diversamente da gran parte degli impianti tradizionali, tramite un processo di separazione selettiva dei diversi materiali plastici e metallici consentendone un recupero ottimale.

POSTER SESSIONS
SESSIONI POSTER

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Posters will be accessible to symposium delegates at all times.

Le presentazioni poster saranno sempre accessibili ai partecipanti del simposio.

L.F. Acedo-Bueno, M.M. Cerrillo-Gonzalez, M. Villen-Guzman, B. Arhoun, J.M. Paz-Garcia, J.M. Rodriguez-Maroto (ES)

A factorial design for the evaluation of the optimal conditions for LiCoO₂ particles Dissolution

M.C.R. Bohana, G. De Jesus, C.M.D.F. Marchi (BR)

Scarti da cantiere: sfide e soluzioni proposte dagli obiettivi di sviluppo sostenibile

M. Cerrillo-Gonzalez, M. Villen-Guzman, B. Arhoun, C. Gomez-Lahoz, J.M. Rodriguez-Maroto, J.M. Paz Garcia (ES)

Modeling of electro dialytic recycling of lithium-ion batteries

B. Arhoun, M. Villen-Guzman, M. Cerrillo-Gonzalez, C. Vereda-Alonso, C. Gomez-Lahoz, J.M. Rodriguez-Maroto (ES)

Use of construction and demolition waste as low cost adsorbents for the removal of acid blue 113 from aqueous solution

M. Villen-Guzman, B. Arhoun, M. Cerrillo-Gonzalez, J.M. Paz-Garcia, C. Gomez-Lahoz, C. Vereda-Alonso (ES)

Valorization of lemon peel as an effective biosorbent for nickel and cadmium removal from aqueous solutions

M. Cerrillo-Gonzalez, M. Villen-Guzman, L.F. Acedo-Bueno, J.M. Paz Garcia, C. Vereda-Alonso, J.M. Rodriguez-Maroto (ES)

Modeling of leaching reaction of LiCoO₂ using an inorganic acid

M. Villen-Guzman, M. Cerrillo-Gonzalez, B. Arhoun, J.M. Paz-Garcia, C. Vereda-Alonso, C. Gomez-Lahoz (ES)

Sequential extraction procedures as a tool to assess the feasibility of recovering valuable metals from solid matrices

W. Brenner, N. Adamovic (AT)

Aspects of sustainability for integrated photovoltaics

N.D. Phonchi-Tshekiso, N.M. Mazrui, G.E.J. Mogomotsi, P.K. Mogomotsi (BW)

In the valley, under the shadow of darkness: the disposal practices of hazardous waste by informal sector garages in Maun, Botswana

W. Schubert, O. De Benedictis, F. Ryan, K. Sutton (US)

Design of Integrated Solid Waste Management Facility for Nuqui, Colombia

M. Ju, J. Jo (KR)

COVID-19, dietary patterns and waste generation

L. Marchiori, A. Albuquerque (PT)

Critical review of industrial solid wastes as barrier material for impermeabilization of storage waste facilities

POSTER SESSIONS

SESSIONI POSTER

F. Duarte Castro, M. Vaccari, L. Cutaia (IT)

Circular economy policies in the European Union and Brazil: a comparison

M. Calero, M.Á. Martín-Lara, A. Pérez, G. Blázquez, M. Muñoz, S. Arjandas, E. Lozano (ES)

Plastic mix recycling from municipal solid waste: characterization of raw material

M. Calero, A. Pérez, Á. Gálvez-Pérez, M.Á. Martín-Lara, G. Blázquez (ES)

Experimental investigation on the air gasification of olive cake at low-medium temperatures

G. Fenocchio, R. Cavallo, E. Rosio, L. Bosio, J. Fresta (IT)

Sperimentazioni per il riuso. Un caso studio tra Italia e Francia: il progetto In.Te. Se