

SUM2016

Third Symposium on Urban Mining and Circular Economy *Terzo Simposio sulle Risorse Urbane e sull'Economia Circolare*

23-25 May 2016 / 23-25 Maggio 2016

Old Monastery of Saint Augustine, Bergamo, Italy

Ex Monastero di Sant'Agostino, Bergamo

Organised by / Organizzato da:

IWWG - International Waste Working Group

Ordine degli Ingegneri della Provincia di Bergamo

Promoted by / Promosso da:

Department for Environment, Energy and Sustainable Development - Regional Government of Lombardia

Assessorato Ambiente Energia e Sviluppo Sostenibile - Regione Lombardia

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PRESENTATION

The urban space should be conceived as the physical, or virtual, environment intended for collective use where rights and duties of citizenship, social information and education, political action, productive and economic activities are carried out. A knowledge of the urban territory implies an awareness of and interaction with the reality surrounding us of which we are an integral part, it means understanding and managing the flow of materials and resources needed by the urban metabolism in terms of requirements and supply of raw materials, responsible and eco-balanced production, sustainable waste management, minimization of uncontrolled and widespread dispersion of potentially polluting substances, and the recovery of resources from residues (urban mining), a virtuous means of closing the material cycle.

It implicates progression beyond separate collection and the current logic of consumers' responsibility, resulting in an increased recovery of resources, better quality of the same, improved environmental protection, involvement of producer responsibility and lower costs for society.

PRESENTAZIONE

Lo spazio urbano va inteso come il luogo (fisico o virtuale) caratterizzato da un uso sociale collettivo nel quale si esercitano i diritti/doveri di cittadinanza, d'informazione, di azione politica, di attività economica e produttiva. Conoscere il territorio urbano significa conoscere e relazionarsi con la realtà che ci circonda e di cui siamo parte integrante, significa conoscere e controllare il flusso di materiali e di energia necessario per il nostro metabolismo urbano, in termini di necessità ed approvvigionamento di materie prime, di produzione responsabile e ecobilanciata, di gestione sostenibile dei rifiuti, di minimizzazione della dispersione incontrollata e diffusa delle sostanze potenzialmente contaminanti, e di recupero di risorse dai residui (urban mining), di chiusura virtuosa del ciclo della materia.

L'Urban Mining nella sua accezione più estesa sta a rappresentare le azioni e le tecnologie che possiamo mettere in atto per recuperare risorse prodotte dal catabolismo urbano (residui civili, industriali, agricoli, di recente o di vecchia produzione) in termini di materie prime seconde e di energia.

Significa superare la logica lineare dello schema: Risorse (in genere fossili e non rinnovabili)-Produzione-Consumo-Rifiuto-Smaltimento per entrare nella logica dell'economia circolare. Significa andare oltre la raccolta differenziata e l'attuale approccio basato sulla responsabilità del consumatore, con maggiore recupero di risorse e migliore qualità, con maggiore tutela dell'ambiente, con il coinvolgimento della responsabilità dei produttori, con minori costi per la collettività. Senza demagogie o ideologiche fughe in avanti che neghino la funzione delle tecnologie di trattamento e dello smaltimento finale con chiusura del ciclo della materia.

THE SYMPOSIUM STRUCTURE (please also see inside front cover)

The Symposium is structured in four parallel tracks, for a total of 19 oral sessions and 9 networking sessions (NeWS).

In oral sessions, contributions (15 minutes) are presented following a strict schedule, in order to enable delegates to plan participation adequately.

Networking sessions aims at involving the audience for informal discussion, experience sharing, and network building. They offer the opportunity to all delegates to present their own perspectives on selected topics and explore new ideas, concepts and partnerships. Sessions A, B and C are entirely held in English. Session D features a mixture of English and Italian presentations.

Poster papers will be presented in an appropriate session, which will be accessible to Symposium delegates at all times on Monday and Tuesday, and discussed in the presence of authors during the morning and afternoon coffee breaks.

Papers were selected according to quality by the Symposium Executive Programme Committee from over 200 offers of papers from 35 different countries.

LA STRUTTURA DEL SIMPOSIO (vedi anche interno della copertina)

Il Simposio è strutturato in quattro sessioni parallele, per un totale di 19 sessioni orali e di 9 networking session (NeWS).

Nelle sessioni orali, le presentazioni (15 minuti) seguiranno rigidamente il programma, in modo tale che tutti possano pianificare in modo adeguato la propria partecipazione.

Le networking session punteranno a coinvolgere l'audience in una discussione informale, con l'obiettivo di condividere esperienze e creare nuovi contatti, offrendo la possibilità di presentare opinioni su specifici argomenti di ricerca. Le sessioni A, B e C saranno interamente tenute in inglese. La sessione D vedrà invece un mix tra presentazioni in italiano e presentazioni in inglese.

I lavori poster saranno presentati in una sessione a parte e saranno accessibili ai partecipanti nelle giornate di lunedì e martedì. La discussione dei poster avverrà alla presenza degli autori durante i coffee break del mattino e del pomeriggio.

I lavori selezionati sono stati scelti in base alla qualità scientifica dal Comitato Esecutivo di Programma fra oltre 200 paper arrivati da 35 paesi diversi.

Symposium Chairman / Coordinatore del Simposio

Raffaello COSSU, *University of Padova (IT)*

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OPENING SESSION - Aula Magna

09:00 - 10:40

Chair / *Presidente*: R. Cossu (IT)

09:00 - 09:40 Welcome Addresses / *Saluti di benvenuto*

- Raffaello Cossu, University of Padova, Symposium Chairman
- Remo Morzenti Pellegrini, University of Bergamo, Chancellor
- Claudia Maria Terzi, Councillor for the Environment, Energy and Sustainable Development, Regional Government of Lombardia
- Pinjing He, Tongji University, Executive Programme Committee

9:40 - 10:40 Opening Lectures / *Relazioni introduttive*

Roberto Cavallo, E.R.I.C.A. soc. coop. (IT)

The importance of popularizing the circular economy concept

Alessandro Marangoni, Althesys (IT)

Circular economy creates shared value

Stefano Paleari, University of Bergamo (IT)

Promoting new ways of thinking: the role of Universities as social institutions

Raffaello Cossu, University of Padova (IT)

Role of BEA and LM in circular economy

10:40 - 11:20 Coffee Break and Poster Discussion

SESSION A1 - aula 5

11:20 - 13:00

Potentials and limitations in circular economy

Chair / *Presidente*: R. Cossu (IT)

J. Fellner, J. Lederer, D. Laner (AT)

Potentials and limitations of a circular economy with respect to primary raw material demand

H.P.H. Arp, G. Okkenhaug, N. Morin, S.E. Hale, A.R. Almas, F. Wania, K. Breivik, M. Sparrevik, P. Anderson (NO)

Are we recycling toxic waste in the circular economy?

C. Cole, T. Cooper (GB)

Consumer decisions determining reuse and product lifetimes

P. Fetsis (BE)

LIFE & circular economy

13:00 - 15:00 Lunch

SESSION B1 - aula 6

11:20 - 13:00

Strategies for WEEE and spent batteries management

Chair / *Presidente*: K. Shih (HK)

P. Nowakowski (PL)

A proposal to improve e-waste collection efficiency in urban mining: container loading and vehicle routing problems

A. Amato, L. Rocchetti, F. Beolchini (IT)

Environmental impact assessment of different end-of-life LCD management strategies

N. Picone, G. Candiani, M. Colledani, M. Pepe (IT)

Fine mixture characterization by hyperspectral imaging (HSI) in WEEE demanufacturing plants

K. Shih, H. Zhou, M. Su (HK)

Regenerate of spent lead paste into submicron lead oxide particles

I. García-Díaz, O. Rodríguez, T. Cebriano, A. López-Fernández, G. Escalante, E. Escudero, P. Fernández, F.A. López (ES)

Synthesis and properties of ZnO from Zn-C spent batteries

Y. Jang, H. Kim, Y. Hwang (KR)

Management and material flow analysis of waste batteries for resource recovery in South Korea

13:00 - 15:00 Lunch

SESSION C1 - aula 7

11:20 - 13:00

Circular economy in developing countries

Chair / Presidente: M. Gericke (ZA)

D. Jazani, A. Dimino (GB)

Circular economy towards the sustainable economy, a model proposal for sustainable village through off-grid computing

A. Vázquez Morillas, J.P. Hermoso López-Araiza, M. Beltran Villavicencio, M. Velasco Pérez, R.Ma. Espinosa Valdemar, A. de la Luz Cisneros Ramos, G.I. González Lopez (MX)

The new way of separation of waste in Mexico City: does it promote valorization?

F. Zambetti, A. Perteghella, M. Vaccari (IT)

Recycling vs. reuse of e-waste - An environmental, economic and social analysis of real case studies in Accra (Ghana)

M. Gericke (ZA)

Development of an E-Waste Implementation Toolkit (EWIT) to support the recycling and secondary raw material recovery strategies in metropolitan areas in Africa

K. Laohalidanond, S. Kerdsuwan (TH)

Strategic waste flow of WEEE for sustainable development in Thailand

J.A. Martínez Sepúlveda, A. Uribe Jongbloed (CO)

Proposal of an inclusive model for the participation of "recyclers" on the implementation of a material recycling facility in Bogotá, D.C., Colombia

13:00 - 15:00 Lunch

SESSION D1 - aula 2

11:20 - 13:00

Aspetti principali della circular economy in Italia - (Italian session)

Chair / Presidente: M.C. Lavagnolo (IT)

F. Giroto, L. Alibardi, R. Cossu (IT)

Stato dell'arte sulla gestione del rifiuto alimentare

L. Rigamonti (IT)

Riutilizzo degli imballaggi in Italia

M.C. Lavagnolo, F. Garbo, R. Cossu (IT)

La gestione delle acque di rifiuto nel contesto dell'urban mining

M. Favot, L. Grassetti (IT)

Le performance del sistema di raccolta dei RAEE in Italia. Quali fattori ne determinano i risultati?

P. Silingardi (IT)

Applicare il concetto di economia circolare in un esempio win-win

13:00 - 15:00 Lunch

SESSION A2 - aula 5

15:00 - 16:40

Aerobic & anaerobic treatment

Chair / Presidente: S. Fiore (IT)

J.F. Saldarriaga, J.E. López, J.L. Gallego, R. Aguado, M. Olazar, G.E. Morales (CO)
Selecting monitoring variables in the composting of municipal solid waste based on principal component analysis

J.F. Saldarriaga, A. Aristizabal, J.L. Gallego, A. Atxutegi, R. Aguado, M. Olazar (CO)
Determination of kinetics parameters for composting process of the organic fraction of municipal solid waste with source separation

I. Noya, S. González-García, S. Feijoo, G. Feijoo, M.T. Moreira (ES)
Innovative technology for organic waste valorisation: anaerobic co-digestion and digestate management as alternative for nutrients recovery

R.M. Espinosa-Valdemar, X. Quecholac-Piña, P.X. Sotelo-Navarro, G. Arango-Escorcía, S. Ojeda-Benítez, A. Vázquez-Morillas (MX)
Comparison of two biological treatments for used baby diapers

F. Demichelis, D. Pleissner, J. Venus, S. Fiore (IT)
Fermentative production of lactic acid and biogas from food waste: preliminary tests

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION B2 - aula 6

15:00 - 16:40

Innovative metal recovery from WEEE

Chair / Presidente: K. Brunelli (IT)

E.M. Iannicelli-Zubiani, C. Cristiani, G. Dotelli, P. Gallo Stampino (IT)
Recovery of valuable metals from electronic scraps by clays and organo-clays: study on biionic model solutions

A.M. Cardinale, G. Cecchi, S. Di Piazza, C. Carbone, M.G. Mariotti, M. Giovine, M. Zotti (IT)
Mycometallurgy: filamentous fungi for recovering precious metals and rare-earth elements from waste materials

P. Cerchier, M. Dabalà, K. Brunelli (IT)
Green synthesis of Ag and SnO₂ nanoparticles from electronic scraps with ultrasounds and microwaves assistance

K. Tsakalakis, A. Benardos, I. Sammas (GR)
Metals recovery from pulverized Printed Circuit Boards (PCBs) by flotation

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION C2 - aula 7

15:00 - 16:40

Waste management issues important for circular economy

Chair / *Presidente*: S. Kalambura (HR)

T. Čolan, S. Kalambura, N. Jovičić, E. Kolarec (HR)

Analysis of application of a new paradigm of circular economy and its influence on municipal waste management in the Republic of Croatia

J. Soukopová, J. Hřebíček (CZ)

Economic and social aspects of current municipal waste management. Case study of landfill tax rise scenarios in the Czech Republic

M. Fedorov, A. Chusov, E. Negulyaeva, M. Romanov, G. Denafas, C. Ludwig (RU)

Ways of improvement for solid waste management system in Saint-Petersburg based on the morphological composition study

P. Viotti, M. Raboni, V. Torretta (IT)

LCA-based software aimed at limiting the CO₂ within an integrated MSW management system

S. Leroi, A. Kahn (BE)

Wet separation techniques (soil washing). From niche recovery to common application for solid waste recovery

L. Ciacci, F. Passarini (IT)

Potentials for carbon emission savings from recovery of metal losses due to dissipation and inefficient recycling

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION D2 - aula 2

15:00 - 16:40

Politiche e strategie della circular economy in Italia - (Italian session)

Chair / *Presidente*: M. Soverchia (IT)

F. Bartolacci, A. Paolini, M. Soverchia, E. Zigiotti (IT)

Le imprese nell'economia circolare: alla ricerca di nuovi modelli di business

M. De Biasio (IT)

Dati, idee e partecipazione pubblica come motore dell'economia circolare

E. Confalonieri, D. Cavanna, P. Zerbinati, S. Passoni (IT)

Le politiche regionali di contrasto allo spreco alimentare

L. Morello, R. Raga, R. Cossu (IT)

Ruolo del final sink nelle strategie di circular economy

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION A3 - aula 5

17:20 - 19:00

Construction and demolition waste

Chair / *Presidente*: G. Bonifazi (IT)

P. Vitale, N. Arena, F. Di Gregorio, U. Arena (IT)

Life Cycle Analysis of the end-of-life phase of a residential building

D. Monfort, P. Michel, L. Rouvreau, M. Serrand, A. L. Gautier, S. Colin, E. Jayr (FR)

The estimation of stock and flow material in a city as a first step to evaluate the recycling potential and future needs for aggregate. Case study in France

B. Sizirici Yildiz, I. Yildiz, S. Naqbi (AE)

Construction and demolition debris generation and composition estimation in Abu Dhabi

P. Gorecký, Z. Horsák, J. Hřebíček, P. Marek, F. Polák, M. Škopán (CZ)

Urban mining of demolition waste. Innovative technology from demolition waste to concrete bricks mixture

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

Concrete drill core characterization finalized to optimal dismantling and aggregates recovery

M.C.M. Bakker, H. Xia (NL)

On the homogeneity of a thick layer of mixed granules in optical quality inspection

SESSION B3 - aula 6

17:20 - 19:00

Secondary (urban) mining of essential functional metals

Chair / *Presidente*: A. Reller (DE)

B. Braibant, D. Bourgeois, D. Meyer (FR)

Three-liquid-phase extraction: a perspective for fluorine chemistry in metal recovery from wastes?

M. Ueberschaar, S. Otto, V.S. Rotter (DE)

Challenges for critical raw material recovery from WEEE - The case study of Gallium

F. Baiguera, M. Colledani (IT)

A knowledge-based method for the prediction of valuable materials in waste printed circuit boards

J. Bachér, T. Kaartinen (FI)

Liberation of Printed Circuit Assembly (PCA) in relation to mobile phone design in a size reduction process

SESSION C3 - aula 7

17:20 - 19:00

Advanced biological treatment

Chair / Presidente: F. Girotto (IT)

M.C. Lavagnolo, R. Rafieenia (IT)

Hydrogen production from biowaste - An overview

L. Alibardi, R. Cossu, F. Girotto (IT)

Hydrogen production from selected food waste fractions

F. Zeman (CA)

Carbon mining from organic waste for methanol production

D. Papurello, L. Tomasi, S. Silvestri, I. Belcari, M. Santarelli, F. Biasioli (IT)

Wastes as sorbent materials for SOFC applications

S. Xu, X. Kong, J. Liu (CN)

Effect of high-pressure extrusion pretreatment to MSW on physicochemical properties and hydrolysis characteristics

SESSION D3 - aula 2

17:20 - 19:00

NeWS: Gestione del carbonio nei flussi secondari adottando l'approccio della circular economy - (Italian session)

Chairs / Presidenti: P. Pavan, F. Cecchi (IT)

Verranno considerati i nuovi approcci esistenti in termini di trattamenti dei flussi secondari di carbonio provenienti da ambiti urbani, agroalimentari ed industriali, in una logica di gestione territoriale. Il focus principale è costituito dall'utilizzo conservativo del carbonio, dirottando per quanto possibile il flusso di massa dal rilascio in atmosfera al fissaggio in matrici ad alto valore aggiunto, quali platform chemicals e precursori di materiali plastici biodegradabili. L'approccio considera la filiera completa in modo tale da evidenziare problemi e sinergie relativi all'integrazione di una serie di processi attualmente disconnessi od utilizzati in una logica non conservativa delle risorse.

Tasks: Il compito della NeWS è di presentare una completa ed esaustiva rassegna delle tecnologie e processi coinvolti in questa logica, con particolare attenzioni agli ambiti relativi ai processi di digestione anaerobica, dark fermentation, produzione ed estrazione di molecole organiche a basso peso molecolare, produzione di PHA.

Risultati attesi: Il principale risultato della riunione sarà quello di evidenziare i bottleneck e le sinergie esistenti tra le varie componenti della filiera, presentando i dati sperimentali ottenuti in questo campo attraverso sperimentazioni dedicate. Sarà quindi dimostrata la potenzialità dell'intera filiera.

Descrizione completa della NeWS disponibile al link www.urbanmining.it/programme

SESSION A4 - aula 5

09:00 - 10:40

Food waste recycling

Chair / *Presidente*: G. De Feo (IT)

L. Lijó, M.T. Moreira, E. Katsou, S. González-García (ES)

Environmental assessment of different alternatives for domestic food waste management

E.J. Martinez, J.G. Rosas, J. Cara, M. Sanchez, C. Marcos, X. Gomez (ES)

Influence of biochar addition in the anaerobic digestion of complex substrates: sewage sludge and orange peels

G. De Feo, A. Di Domenico, S. Abate (IT)

Survey about management of waste cooking oil from households: a case study

P.J. Shaw, M.M. Smith (GB)

Recipes for the prevention of bread waste?

V. Vadivel, A. Moncalvo, R. Dordoni, G. Spigno (IT)

Acid/alkaline treatment for the recovery of antioxidants and cellulose from different agro-food by-products

10:40 - 11:20 Coffee Break and Poster Discussion

SESSION B4 - aula 6

09:00 - 10:40

Plastic recycling

Chair / *Presidente*: J.R. Bartoli (BR)

Z. Horsák, J. Hřebíček, M. Straka (CZ)

Urban mining plastics. Processing low-density polyethylene in circular economy

J. Nedenskov (DK)

Method for monitoring collection efficiency for recyclable plastic waste based on flue gas measurements

P. Bozano Gandolfi, V. Nosiglia (IT)

TriFlo®: dense medium separator for plastic and glass recycling

G. Cerminara, F. Garbo, L. Morello, M.C. Lavagnolo, R. Cossu (IT)

LCA approach for Plasmix management

J. Bartoli, N. Quispe, F. Zanata, E. Fernandes, D. Souza, E. Ito (BR)

Adding value to primary recycled PBT by the addition of nanoclays

J. Judl, K. Manninen, O. Sahimaa, J. Salminen, H. Eskelinen, H. Dahlbo, O. Väntsi (FI)

Wood-polymer composite - A step towards circular economy?

10:40 - 11:20 Coffee Break and Poster Discussion

SESSION C4 - aula 7

09:00 - 10:40

Slag & ash recycling

Chair / *Presidente*: F. Faleschini (IT)

A. Krausová, M. Šyc, R. Šomplák, M. Pavlas, P. Kameníková (CZ)

Characterization of bottom ash from waste-to-energy plants

K. Phoungthong, H. Zhang, L.M. Shao, P.J. He (CN)

Phytotoxicity of thermal treatment residues leachates and their ground water pollution risk prediction

F. Faleschini, K. Brunelli, C. Pellegrino (IT)

Valorization of electric arc furnace slag for concrete production

J. Lederer, J. Fellner (AT)

Evaluating the resource potential and value of MSWI residues for its application in the Austrian cement industry

M. Hache, F. Bilek (DE)

Leaching and extraction techniques for rare earth elements from waste combustion ashes

O. Müller (CH)

InovaRe - The best out of two methods bottom ash extraction and further treatment

10:40 - 11:20 Coffee Break and Poster Discussion

SESSION D4 - aula 2

09:00 - 10:40

NeWS: Nuova tariffazione come incentivo alla circular economy - (*Italian session*)

Chair / *Presidente*: G. Ghiringhelli (IT)

La legge di stabilità 2014 disciplina l'applicazione della nuova tassa sui rifiuti (TARI). Con il comma 667 della Legge Finanziaria 2014, recentemente riproposto nell'art. 42 "Collegato Ambientale", si stabilisce che al fine di dare attuazione al principio "chi inquina paga", elemento fondamentale della Circular Economy, entro un anno dall'entrata in vigore della legge, il MATTM deve definire i criteri per la realizzazione da parte dei Comuni di sistemi di tariffazione puntuale, con il fine di attuare un modello tariffario commisurato al servizio reso a copertura integrale dei costi del servizio. Da alcuni mesi è disponibile una bozza di questo Regolamento che delinea gli elementi distintivi di quella che dovrà essere la futura tariffa puntuale o corrispettiva ovvero:

- Criteri per la realizzazione di sistemi di misurazione puntuale della quantità di rifiuti
- Requisiti minimi dei sistemi di misurazione puntuale
- Sistemi di identificazione (delle utenze)
- Misurazione diretta della quantità di rifiuto
- Determinazione dei conferimenti da parte di utenze aggregate

Descrizione completa della NeWS disponibile al link www.urbanmining.it/programme

10:40 - 11:20 Coffee Break and Poster Discussion

SESSION A5 - aula 5

11:20 - 13:00

NeWS: Mining food waste in an urban context

Chair / *Presidente*: P. Shaw (GB)

The purpose of this session is to explore and develop connections between researchers who focus on or have an interest in management of food waste. This session will emphasize specifically food waste in urban environments, with the following purposes:

- To identify those aspects of food waste and its management that are of the highest importance in urban settings
- To establish where and there are connections and interactions between processes, materials and people with regard to food waste
- To explore and identify where there is scope to make positive changes in urban food waste management through collaboration

The session will address food waste in a range of sectors, including (but not restricted to): retail suppliers and providers of consumer foods and food products, householders, institutional catering facilities (e.g. schools), and commercial food outlets (e.g. restaurants and cafes).

Full NeWS description available on www.urbanmining.it/programme

13:00 - 15:00 Lunch

SESSION B5 - aula 6

11:20 - 13:00

Urban mining opportunities for different materials

Chair / *Presidente*: I. Bianco (IT)

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

Re-use of packaging in Italy

G. De Feo, B. Cuomo, N.G. Giordano, G. Liguori, P. Pesce (IT)

Potential recovery of paper and cardboard from urban residual waste: performance analysis of municipalities in Southern Italy

V. Belgiorno, A. Cesaro, A. Voto (IT)

Urban mining of residual waste bales

X. Pierron, I. Williams, P. Shaw, V. Cleaver (GB)

Applying behavioural economics to exploit materials from a university distinct urban mine

I. Bianco, G.A. Blengini (IT)

An analytical and flexible approach for the Life Cycle Assessment of dimension stones

E. Ferber, R. Schmidt (DE)

Recovery of metals and alloys from grinding swarf using vacuum thermal desorption

R. Cremiato, M.L. Mastellone, L. Zaccariello (IT)

A detailed material balance of a material recovery facility performance fed by mixed packaging waste

SESSION C5 - aula 7

11:20 - 13:00

Waste architecture & circular economy

Chair / Presidente: E. Cossu (IT)

E. Cossu, A. Artuso, (IT)

Waste architecture & circular economy

S. Dalzero (IT)

Waste disposal and recycling sites perspectives and contemporary approaches

I. Vestergaard, G. Martín Jiménez (DK)

Urban mining as a driver for teaching architectural design

S. Dalzero (IT)

Remains, debris, ruins. From decontamination issues and disposal to the configuration of new landscapes

13:00 - 15:00 Lunch

SESSION D5 - aula 2

11:20 - 13:00

NeWS: The Italian framework - Case law, recent developments and future perspectives for plastic scraps

Chair / Presidente: F. Peres (IT)

The conditions to qualify as a by-product are often hard to fulfill. This is mostly true for plastic scraps, which are usually subjected to shredding operations prior to be commercialized. In fact, one of the main requirements for by-products is that they can just undergo operations of "ordinary industrial practice". Italian case law has always refused to include shredding operations in this category, but the ruling changed with the recent decision of the Court of Cassation no. 40109/2015. However, if the plastic scraps are not qualified as by-products but as waste, the recovery operations could enjoy a simplified regime of authorization (the activities can start 90 days after the notice to the authorities) following the requirements of Ministerial Decree of 5 February 1998. In this case they become End of Waste when the outcome of the recovery is consistent with the standard UNI 10667, which will probably be revised in the next future. New developments are also expected for by-products, after the draft recently issued by the Italian Ministry of Environment concerning a ministerial decree with many clarifications (or even more) on the law requirements.

13:00 - 15:00 Lunch

SESSION A6 - aula 5

15:00 - 16:40

Landfill mining

Chair / *Presidente*: R. Raga (IT)

A. Winterstetter, D. Laner, E. Wille, P. Nagels, H. Rechberger, J. Fellner (AT)
Development of a resource classification framework for old landfills in Flanders (Project RECLAF)

L. Morello, R. Cossu (IT)

Landfill mining of material from an old lab scale lysimeter reactor

M. Menegaki, D. Damigos, D. Kaliampakos, S. Papagrigoriou, Z. Gaitanarou, S. Stasinou (GR)

LIFE RECLAIM: initial results from a landfill mining pilot project in Greece

I. Frantzis, D. Skoura (GR)

Landfill mining and municipal solid waste treatment: a case study in Messini area

16:40 - 17:20 Coffee Break and Poster discussion

SESSION B6 - aula 6

15:00 - 16:40

Urban mining in wastewater management

Chair / *Presidente*: B. Ruffino (IT)

F. Giroto (IT)

Recycle of adult diapers as adsorbent in Ammonia removal from wastewater

M.C. Lavagnolo, F. Garbo, R. Cossu (IT)

Wastewater management in the urban mining context

L.M. Ottosen, A.K. Huntley, P.E. Jensen, G.M. Kirkelund (DK)

Sewage sludge ash as additional component in mortar

B. Ruffino, G. Campo, A. Cerutti, M.C. Zanetti (IT)

Recent developments for the recovery of material and energy from waste activated sludge

16:40 - 17:20 Coffee Break and Poster discussion

SESSION C6 - aula 7

15:00 - 16:40

NeWS: Circular economy - strategies in the different EU countries

Chair / Presidente: D. Sciunnach (IT)

The transition from a linear to a circular economy needs a substantial reconsideration of our traditional production and consumption models. The so-called “Circular Economy Pack” issued by the European Commission at the close of 2015 represents a substantial spur for policies and practices aimed at “closing the loop”, basically through 1) a more efficient recovery of matter from the waste, and 2) the making of goods more prone to waste production prevention, or waste recycling, through smart eco-design choices.

At the moment, such policies do not emerge with the needed centrality and urgency from the European regulatory scenario that, although favourable in principle to Circular Economy practices, actually has not enhanced them with the due effectiveness until now.

Identifying the boundary conditions that do not allow a faster spreading and rooting of Circular Economy good practices requires a multivariable analysis taking into account for each Member State.

Aim of the session is the presentation of different European (and global?) “closing the loop” standards to be analyzed and compared, in order to identify regulatory obstacles, promote communication of best practices and enhance their emulation.

Full NeWS description available on www.urbanmining.it/programme

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION D6 - aula 2

15:00 - 16:40

NeWS: Materials from the recycling of packaging waste: quality & market

Chairs / Presidenti: L. Rigamonti, C. Santella (IT)

The session will focus on the quality of the materials obtained from the recycling of packaging waste and on their actual return to the market. In general the recycling processes lead to a reduction of the quality of the material (i.e. the so-called phenomenon of “downcycling”): this is well known for example for paper and the mix of plastics, but a more detailed analysis should be conducted also for metals. During the melting of metal scraps a part of impurities and alloying elements remains in the metallic phase. Moreover, the accumulation of dangerous substances, such as stabilizers, flame retardants or mineral oils, could compromise the use of secondary materials. The session will thus take stock of the existing research activities on the quality of secondary materials and their subsequent use in the market. This is of fundamental importance to understand the actual replacement of the materials produced from virgin raw materials with secondary materials. It would also help to increase the reliability of Life Cycle Assessment (LCA) studies used as a support decision tool in the choice of technologies and treatments aimed at the sustainable use of resources and to close the loop

Full NeWS description available on www.urbanmining.it/programme

16:40 - 17:20 Coffee Break and Poster Discussion

SESSION A7 - aula 5

17:20 - 19:00

NeWS: Circular economy and landfill mining: key concepts to exploit waste as new resources

Chair / *Presidente*: G. Dino (IT)

Europe has somewhere between 150,000 and 500,000 landfill sites which potentially represent a significant reserve of critical and secondary raw materials (CRM and SRM). Such “new ore bodies”, from municipal and industrial landfills as well as from mining waste, can be exploited through landfill mining. This approach to waste management is closely linked to two pillars of the EU policy: waste recycling and resource preservation.

In this context it is fundamental to highlight that WASTE has to be considered as a RESOURCE. The two key concepts that underpin these new resources are: landfill mining and circular economy approaches.

The discussions and debates introduced in the present networking session are: “state of the art” about EU waste production and waste management; landfill mining situation across Europe and potential with a UK case study; impacts (positive/negative) connected to waste management VS impacts (positive/negative) connected to landfill mining; recycling potential of SRM; circular economy approach; SMART GROUND project presentation; landfill mining: the point of view of a MSW management company (landfill and treatment plant); aggregate from C&DW: the point of view of a C&DW recycling plant.

Full NeWS description available on www.urbanmining.it/programme

SESSION B7 - aula 6

17:20 - 19:00

NeWS: Waste flows as information highways of the circular economy

Chair / *Presidente*: M. Bakker (NL), G. Bonifazi (IT)

The rise of sensor technology in the recycling industry for materials sorting and quality inspection is mostly motivated by company economics and efficiency of their own processes. However, in a circular economy a chain of companies supporting a supply chain of raw secondary materials will have to work closely together to meet the material demands of end producers in terms of supply and quality. Sensor data can provide real-time and continuous information to match those needs for which the data must be shared. The main topic and basis for discussions is the question: how can sensor data from waste flows help optimize and economize the full secondary raw materials supply chain from waste collection to recycled product marketing?

Full NeWS description available on www.urbanmining.it/programme

SESSION C7 - aula 7

17:20 - 19:00

Waste to energy

Chair / Presidente: P. Vitale (IT)

M. Rüdlinger, N.N. Vasen (CH)

Modular zero-emission energy plants: bio-residues & waste to energy & synthetic fuel

P. Bartocci, M. Barbanera, M. D'Amico, P. Laranci, G. Cavalaglio, M. Gelosia, D. Ingles, G. Bidini, C. Buratti, F. Cotana, F. Fantozzi (IT)

Thermal degradation of drifted wood: combustion, gasification and pyrolysis tests at the Biomass Research Centre

M. Anzano, E. Collina, M. Lasagni (IT)

Lab-scale pyrolysis of ASR light fraction and product characterization

M. Zubkova, A. Stroganov, A. Chusov, D. Molodtsov (RU)

Municipal solid waste landfills as an energy resource of hydrogenous fuel production for efficient system usage

M. Edo, E. Björn, P.E. Persson, S. Jansson (SE)

Variation of contaminant content in waste wood fuel - A case study ranging over nine years

A. Anca-Couce, G. Cinti, P. Bartocci, G. Bidini, F. Fantozzi (IT)

Use of waste glycerol pyrolysis products in fuel cells

SESSION D7 - aula 2

17:20 - 19:00

NeWS: Organic waste management in urban context

Chair / Presidente: G. Spigno (IT)

Topics:

- Strategies for the valorisation of urban and industrial food waste and green waste into new high added value compounds. Feasible and flexible solutions: a real possibility or just a dream?
- Small scale systems for conversion of urban food and green waste into energy and biochar.
- Biochar from urban food and green waste: potential re-applications in the urban context.
- Socio-economic aspects related to recycling of urban food and green waste.

Tasks:

- To collect opinions and experimental cases on the above topics.
- To define the gaps to be filled for a sustainable and innovative re-cycling of urban food and green waste.

Expected achievements:

- Creation of a working group for the preparation of a review paper on the session topics.
- Development of new ideas and working groups for definition of project proposals under the EU framework and other funding opportunities.

POSTERS SESSION / SESSIONE POSTER

01_ S.K. Pradhan, R. Jaideva, M. Bagari, K. Kumar (IN)

Investigation into design issues related to development of a scavenging vehicle for Indian railway track waste management

02_ Y. Jiang, Y. Zhang (CN)

Robust optimization on sustainable biodiesel supply chain produced from waste cooking oil under price uncertainty

03_ H.L. Chiang, K.H. Lin (TW)

Removal of volatile organic compounds and dyes by the reused sludge adsorbent

04_ Z. Zhou, G. Dai, C. Zhang, X. Zhang, F. Chen (CN)

Research of automatic disassembly and recycling of windshield of ELV

05_ H.L. Chiang, K.H. Lin (TW)

Pyrolysis characteristics of integrated circuit board from electrical waste and the derivative exhaust control

06_ N. Tsydenova (RU)

Comparing waste treatment options - The example of Toluca region (Mexico)

07_ C. Martínez García, T. Cotes Palomino, R. D. Farias (ES)

Life Cycle Assessment - Ceramic materials and waste from olive oil industry

08_ C. Martínez García, T. Cotes Palomino, Fco. De Asís Torres Fernández, J. Martínez Nájera, A.M. Coves Martínez (ES)

Innovation in teaching techniques of materials engineering and waste management

09_ T. Cotes Palomino, C. Martínez García, F.A. Corpas (ES)

Waste of beer brewery and sustainable ceramic

10_ T. Cotes Palomino, C. Martínez García, A. Díaz, F.J. Iglesias (ES)

Alperujo use as raw material in ceramics

11_ P.M. Sall, H. Antoun, F-P. Chalifour, C.J. Beauchamp (CA)

On farm composting of fruit and vegetable waste from grocery stores: a case under cold climatic conditions of Eastern Canada

12_ N. Schaeffer, C. Cheeseman, S. Grimes (GB)

Leaching and electrowinning of copper from waste printed circuit boards using an ionic liquid

13_ F. Chen, W. Zhang, B. Yang, J. Ma, J. Lv, Y. Yang (CN)

Enhanced recycling networks of spent batteries from e-bicycle: a case of Xuzhou, China

14_ I. Orko, M. Lundström, P. Kangas, P. Koukkari (FI)

Hydrometallurgical processing of jarosite waste to value-added products

15_ B.C. O'Kelly (IE)

Assessing the shear strength of municipal sludges and residues for landfill disposal

16_ P. Fetsis (BE)

LIFE & circular economy

17_ M. Ragazzi, C. Brescian, E. Girelli, E.C. Rada, M. Schiavon, V. Torretta (IT)

Analysis and measures to improve waste management in schools

18_ E. Ferber, R. Schmidt (DE)

Recovery of metals and alloys from grinding swarf using vacuum thermal desorption

GUIDED TECHNICAL TOUR / VISITA TECNICA GUIDATA

A guided technical tour has been arranged on Wednesday 25th May at Montello Spa (approximately 15 km from Bergamo), a real scale plant leader in sorting, recovery and recycling of post-consumer plastic packaging as well as the treatment, recovery and recycling of organic waste.

Places are limited and have been assigned on a first-come first-served basis. Participants who have not yet booked their place but would like to attend the technical tour should contact a member of staff at the Registration Desk as soon as possible.

Coaches provided by the organizers will leave from the Symposium venue at 9:00 sharp; delegates are therefore advised to be at the departure point at least 15 minutes prior to the coach departure time.

Expected return to the Symposium venue is approximately 13:30.

La visita tecnica programmata per mercoledì 25 maggio riguarderà gli impianti di Montello Spa (a circa 15 km da Bergamo), industria leader nel trattamento di selezione, recupero e riciclo di imballaggi in plastica post-consumo e nel trattamento, recupero e riciclo di rifiuti organici da raccolta differenziata.

I posti sono limitati e sono stati assegnati strettamente in ordine di prenotazione. I partecipanti che non avessero ancora prenotato il proprio posto ma che volessero partecipare alla visita tecnica sono pregati di contattare lo staff presso il banco di registrazione il più presto possibile.

Il bus partirà dalla sede del Simposio alle ore 9:00 in punto; i partecipanti dovranno pertanto farsi trovare nel piazzale antistante la sede del Simposio almeno 15 minuti prima della partenza.

L'orario di rientro alla sede del Simposio è previsto per le ore 13:30 circa.

SUPPORTERS / SPONSOR

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Un ringraziamento speciale ai nostri sponsor!

Montello S.p.A.

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Industria del Recupero e Riciclo
Plastica - Fertilizzanti - Energia

www.montello-spa.it

Montello SpA is located in the homonymous municipality in Bergamo city (in the North of Italy) in an industrial area of around 450,000 m², 120,000 of which are indoors and has a staff of about 550. It is ISO 9001, ISO 14001, ISO 18001 and ISO 50001 certified and operates in the two following business activities:

1. sorting, recovering and recycling of 150,000 tons/year of post-consumer plastic packaging waste from separated waste collection, treated and used to produce secondary raw materials in form of PET flakes (separated in colourless, blue and mix colours), HDPE granules, LDPE granules and MIXED POLYOLEFIN granules, as well as manufactured products such as GEOMONT® textured geomembranes used in the construction industry, produced with innovative technologies and a continuous treatment which, starting directly at the HDPE containers (waste), achieves the manufactured product (final product) without interrupting the process.

80% of treated plastic waste is recovered and recycled in secondary raw materials and finished products and the remaining 20%, duly prepared and treated in Montello, goes to cement plants and to blast furnaces as Solid Recovered Fuels (SRF).

2. treatment and recovering of 369.000 tons/year of organic municipal solid waste from separated waste collection. The anaerobic and aerobic treatment has the aim to energy recover the generated biogas in electro-thermal cogeneration groups (12,8 MWe installed) and to produce an high quality organic amendment (compost). Montello SpA is in process of implementing an upgrading system of biogas to produce biomethane for automotive applications and recovery of CO₂ suitable to be reused in industrial production cycles, including food applications.

90% of treated organic waste is recovered and recycled in an high quality fertilizer, electric and thermal energy, biomethane as alternative second generation fuel and CO₂ for food applications and the remaining 10%, duly prepared and treated in Montello, goes to cement plants and to blast furnaces as Solid Recovered Fuels (SRF).

In summary, the treatment and recover activities carried out in Montello allow to reach an "around zero" residual waste. The environmental benefits achieved by both activities can be quantified in terms of 290,000 tons equivalent of CO₂ saved.

Relight Srl

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info@relightitalia.com / www.relighitalia.it/



Relight srl is a private company founded in 1999 for the collection and treatment of electrical and electronic equipment waste (WEEE).

Relight is one of the first Italian companies that deals with WEEE and thanks to its great experience is specialized in collection, transport and treatment of electronic waste. Main customers are collective schemes, communities and private companies. The integrated approach of Relight, that both provides a collection and a full treatment service, gives the customer an efficient service where all the steps are controlled and performed at high quality level (Relight is ISO14001 certificated and EMAS registered since 2005).

Since the beginning the main aim of Relight activities is to close the loop and find solutions for the recycling of the different fractions that compose a WEEE, trying to reach the "end of waste" status for critical fractions, such as for example CRT glass and fluorescent powders.

Relight innovative approach is addressed both to new treatment technologies and to new recycling field for waste fractions.

The innovative service offered by Relight is performed in one treatment plant, with a total authorized capacity of 40.000 tons/year, and is devoted to the treatment of different appliances: CRT equipment, fluorescent lamps, small electronic appliances, big white goods.

INSTRUCTIONS FOR SESSION CHAIRS & SPEAKERS

ISTRUZIONI PER PRESIDENTI DI SESSIONE & RELATORI

Instructions for Chairs of Sessions

On arrival at the Symposium venue chairs of oral sessions 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, session 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 sono gentilmente pregati di contattare il banco relatori al loro 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 svolge 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 ed affinché 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 nelle sessioni parallele.

Information for Speakers

Speakers should contact the session 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. The time available for each presentation is 15 minutes in all sessions (A, B, C and D). Chairs will ensure that times are strictly adhered to.

During the presentation commercial advertising should be avoided. Mention of affiliations or company name should be very discreet.

A duty member at the Speakers' Desk is on hand for all requirements. A PC is available for speakers' use and priority will be given in line with session timetable. The computer at the Speakers' Desk may not be used to prepare presentations, but only to make last-minute changes or a final check.

Speakers who have not sent a copy of their PowerPoint presentation to the Organising Secretariat prior to the conference are kindly requested to contact the Speakers' Desk no later than during the session prior to that in which their own presentation is scheduled (should this be scheduled in a morning session, the deadline for contacting the Speakers' Desk is the evening of the day before).

Speakers should ensure their presentations are delivered to the pertinent conference staff in a timely manner. No additional time will be provided for late arrival presentations. If your allowed 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 synthesized version.

Informazioni per i Relatori

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. Il tempo a disposizione per ciascuna presentazione è di 15 minuti per tutte le sessioni (A, B, C e D). Il presidente di sessione provvederà affinché tale limite sia strettamente osservato.

Nella presentazione va assolutamente evitata qualsiasi forma di pubblicità. La presenza del vostro ente o ditta di appartenenza deve essere molto discreta.

Al banco relatori sarà sempre presente un incaricato dell'organizzazione per fornire eventuale assistenza. Un computer è a disposizione dei relatori con precedenza che rispetta gli orari della sessione di presentazione. 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 propria 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 relazione (se si tratta di una sessione in programma per la mattina, il termine ultimo per contattare il banco relatori sarà la sera precedente).

I relatori dovranno assicurarsi che la loro presentazione sia consegnata allo staff di riferimento secondo le tempistiche indicate in quanto non sarà possibile garantire tempo supplementare agli autori le cui presentazioni non saranno pervenute per tempo.

Durante la comunicazione orale, nel caso stia per terminare il tempo a disposizione, si consiglia 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

- Participation in Symposium sessions
- Proceedings (USB pendrive)
- Conference materials
- Wi-Fi access to University of Bergamo network (please collect your password from the Registration Desk)
- Coffee breaks
- Participation in guided technical tour (bus transport included)
- Gala dinner

Cosa è incluso nella vostra iscrizione

- *Partecipazione alle sessioni del Simposio*
- *Atti del Simposio su USB pendrive*
- *Materiale congressuale*
- *Accesso Wi-Fi alla rete dell'Università di Bergamo (si prega di richiedere la password al banco relatori)*
- *Coffee breaks*
- *Partecipazione alla visita tecnica guidata (trasporto con bus incluso)*
- *Cena di gala*

Registration and Speakers' Desks / Segreteria e Banco Relatori

The Registration and Speakers' Desks will be open in Aula 1 of the Symposium venue with the following schedule:

- Monday May 23rd from 08:30 to 09:00, 10:40 - 19:00
- Tuesday May 24th from 08:30 to 19:00

Il banco segreteria e il banco relatori saranno aperti presso l'Aula 1 della sede del Simposio ai seguenti orari:

- *lunedì 23 maggio dalle 08:30 alle 09:00, 10:40 - 19:00*
- *martedì 24 maggio dalle 08:30 alle 19:00*

Partner Restaurants / Ristoranti Convenzionati

Special rates and set menus have been arranged at the following restaurants in the vicinity of the Symposium venue:

- La Vendemmia
- Caffè della Funicolare
- Da Mimmo

Please refer to the Symposium map on the inside back cover for details on their exact location. Detailed information on prices and menus is available on a separate sheet provided with your registration pack.

Bookings should be made no later than 11:00 at the Registration Desk, where lunch coupons will be provided to ensure that discounts are applied at the restaurants.

I partecipanti potranno usufruire di tariffe speciali e menù fissi scontati presso i seguenti ristoranti situati nelle vicinanze della sede del Simposio:

- La Vendemmia
- Caffè della Funicolare
- Da Mimmo

Per maggiori informazioni sull'ubicazione esatta dei ristoranti si prega di consultare la mappa all'interno del retrocopertina del programma.

Informazioni dettagliate sui prezzi e i menù concordati sono invece disponibili su una lista separata fornita al momento della registrazione.

Le prenotazioni per i pranzi devono essere effettuate giornalmente al banco registrazioni entro le 11:00, lo staff del Simposio provvederà a fornire dei coupon che dovranno essere consegnati al ristorante per assicurarsi che vengano applicati gli sconti previsti.

SOCIAL EVENTS / EVENTI SOCIALI

Monday 23rd May / Lunedì 23 maggio

19:00 Guided walking tour of Bergamo's upper city and traditional dinner
Visita serale guidata (a piedi) della città alta di Bergamo e cena tradizionale

Discover the beauty of Bergamo's upper city and its hystorical monuments and buildings, and taste the most iconic dishes of Bergamo with a traditional dinner at "La Tana" restaurant.

Departure from the Symposium venue at the end of sessions.

Cost: €35 for guided walking tour & dinner, €10 for walking tour only, €25 for traditional dinner only

Reservations to be made at the Registration Desk no later than 12:00 on Monday 23rd May.

Visita alla scoperta della città alta di Bergamo e i suoi monumenti ed edifici più rappresentativi, seguita da una cena tradizionale bergamasca al ristorante "La Tana".

Partenza dalla sede del Simposio al termine delle sessioni.

Costo: €35 per la visita guidata e la cena, €10 solo per la visita guidata, €25 solo per la cena tradizionale

Le prenotazioni sono da effettuarsi al banco segreteria entro le 12:00 di lunedì 23 maggio.

Tuesday 24th May / Martedì 24 maggio

20:00 Gala dinner / *Cena di gala*
"Colleoni & Dell'Angelo" restaurant

All delegates are invited to a formal dinner in the "Colleoni & Dell'Angelo" restaurant in Bergamo's upper city.

Entrance to the dinner is by invitation only - these should be collected from the secretariat no later than 11:00 on Tuesday 24th May.

The cost of the dinner is included in the registration fee for Symposium participants. Tickets for non-delegates should be purchased from the Registration Desk.

Tutti i partecipanti sono invitati a prendere parte ad una cena formale che si terrà al ristorante "Colleoni & Dell'Angelo" nella città alta di Bergamo.

Il costo della cena è incluso nella quota di iscrizione al Simposio. I partecipanti potranno ritirare il proprio invito rivolgendosi all staff del banco segreteria entro le 11:00 di martedì 24 maggio.

Presso il banco segreteria saranno, inoltre, in vendita biglietti per eventuali accompagnatori non iscritti al Simposio.

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 or print+electronic subscription. (electronic subscription includes access to back numbers from 1995).
- Access to the members area on the website
- Access to previous editions of IWWG conferences proceedings (Index)
- Access to the IWWG members discussion forum on the website
- Free download of LeachXS - Lite from the members area on the website
- Discount on IWWG Training Course Registration
- Discount on IWWG Seminar Registration
- Discount on the entrance fee of IWWG international waste management symposia (official IWWG conferences)
- Discount on IWWG publications (e.g. textbooks)
- Discount on Elsevier publications
- Participation in all activities of IWWG including task groups

For further information please contact:

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info@iwwg.eu / www.iwwg.eu



EUROWASTE SRL

Eurowaste Srl is a small specialised Company developed to manage communication and education tools (conferences, seminars, training courses) in connection with research activities performed in the field of environmental engineering by the University of Padova.

Since 2005 Eurowaste has set up a collaboration with IWWG-International Waste Working Group, established in 2002, following a world-wide demand, to serve as a forum for the scientific and professional community.

Eurowaste periodically organizes some of the main Conferences promoted by IWWG such as the Sardinia Waste Management and Landfilling Symposium, the Venice Energy from Waste and Biomass Symposium and the SUM Symposium on Urban Mining and Circular Economy.

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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:

IWWG Monograph series:

- Sustainable Landfilling
- Management and Landfilling of Solid Wastes in Developing Countries
- Landfill Aeration

Other Monographs:

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

Conference Proceedings

- Venice International Symposium on Energy from Biomass and Waste
- Sardinia International Waste Management and Landfill Symposium
- SUM - Symposium on Urban mining

Publications available at the registration desk.

Please visit the official website: www.cisapublisher.it

Operational head office

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ARCOPLAN Studio

Arcoplan is a consultancy of professionals, founded in 2009 by Anna Artuso, architect, and Elena Cossu, engineer, active in the architectural aspects connected to waste management systems.

It cooperate with international leading experts in the technologies involved in the field.

Arcoplan has a solid experience in: Remediation Plans, Functional restoration of old and new landfill sites, Landfill mining for land reuse and reintegration of large areas into the landscape; Landscape Architecture; Integration of pneumatic waste collection system in the urban space; Graphic and design of the elements for separate collection; Reuse Centers; Architecture of the buildings for waste pretreatment and composting plants.

Arcoplan also strives to disseminate the above topics by collaborating to the organization of scientific conferences connected to the research activities carried out by the University of Padova in the field of environmental engineering. Since 2009, indeed, it has been working alongside Eurowaste srl for the production and organization of International Symposia, registering the attendance of over 800 delegates from throughout the world.

Arcoplan has recently given rise to '**Waste Architecture Platform**', a complex project conceived as a container of initiatives devoted to environmental architecture in connection with interventions concerning the collection, disposal and management of waste. Waste Architecture is a new and relatively unexplored conceptual and design topic which promises to give rise to a lively debate between environmental professionals, and architecture and urban design experts.

ARCOplan - Studio Associato di Ingegneria e Architettura

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ORDINE DEGLI INGEGNERI DI BERGAMO

Crediti Formativi Professionali (only for Italian delegates)

Il Simposio SUM 2016 è accreditato dall'Ordine degli Ingegneri della Provincia di Bergamo per il riconoscimento dei crediti formativi professionali.

La partecipazione al convegno dà diritto a tutti gli ingegneri iscritti ad un Albo provinciale all'acquisizione di un massimo di **6+6 CFP** per la partecipazione alle sessioni orali + **3 CFP** per la visita tecnica.

I crediti vengono attribuiti in base al seguente schema:

- n. 6 CFP per la partecipazione all'intera giornata di convegno, con obbligo di frequenza del 100% (e con possibilità di scegliere tra le diverse sessioni)
- n. 3 CFP per la partecipazione alla visita tecnica.

| sessioni | data | ore | CFP |
|----------------|---------|-----|-----|
| A / B / C / D | 23 / 05 | 8 | 6 |
| A / B / C / D | 24 / 05 | 8 | 6 |
| visita tecnica | 25 / 05 | 4 | 3 |

All'entrata di ciascuna sessione saranno disponibili i moduli per la raccolta delle firme in entrata ed uscita.

Gli interessati sono pregati di contattare la segreteria organizzativa per richiedere l'attestato di frequenza e per comunicare il proprio codice fiscale, ordine di appartenenza, sezione e numero di iscrizione all'Albo.

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ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI
BERGAMO









































