Waste Management 34 (2014) 242–245

Contents lists available at ScienceDirect

Waste Management

journal homepage: www.elsevier.com/locate/wasman

IWWG News & Views

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In this section of the Journal the reader will find information on the IWWG (International Waste Working Group), reports on activities carried out by Task Groups, a list of future events and relevant notes on the think tank elaboration and activities of the association.
In this issue: report from Sardinia 2013 – Fourteenth International Waste Management and Landfill Symposium, and updates on the activities of the IWWG Task Group on Landfill aeration.

Report from the Fourteenth International Waste Management and Landfill Symposium – Sardinia 2013

The fourteenth edition of the Sardinia Symposium, organized by the IWWG (International Waste Working Group, www.iwwg.eu), was held in Forte Village, Santa Margherita di Pula, Italy, from September 30th to October 4th.

The event was attended by 760 participants (researchers, technicians, administrators and operators) from 63 different nations with the presentation of 571 scientific papers, selected according to quality by the Executive Programme Committee from 832 offers of papers from 75 different countries worldwide.

The traditional issues of waste prevention, material and energy recovery, waste treatment and final disposal were addressed in 32 general sessions, 48 specialized sessions, 34 workshops and 12 Italian sessions where new ideas and concepts were presented and thoroughly discussed. Moreover, several workshops were devoted to the presentation of innovative international projects.

As usual, the conference provided for extensive discussion on the optimization of existing technologies and development of new ideas, placing particular emphasis on controversial issues such as thermal treatment (incineration, pyrolysis, gasification), and the production and use of CDR, including monitoring environmental impact and health effects of emissions.

The opening lecture of Sardinia 2013 Symposium was given by Prof. Jean Bogner (University Illinois at Chicago, US), who presented a comprehensive overview about landfill processes and the most important concepts that have characterized their developments over the last 40 years. Her lecture focused mainly on the following three aspects:

- creative strategies for improved quantification of urban-scale waste generation and diversion from landfilling, including quantification of the materials, energy and financial impact of the informal sector in developing countries;
- moving beyond strict reliance on a first order kinetic equation for landfill methanogenesis;
- using an improved quantitative understanding of landfill methane emissions and oxidation, based on a decade and a half of field measurements and modeling, to guide regulatory and carbon policy decisions.

Prof. Bogner summarized a lifelong research career with vibrant words: "Looking backward exactly 40 years have passed since the publication of Farquhar & Rovers (1973, *Gas Production during Refuse Decomposition*, Water, Air, & Soil Pollution). For many of us, this groundbreaking publication on landfill gas evolution over decadal timeframes provided a starting point for our own careers in waste management. Those who attended Sardinia 2007 heard Graham Farquhar discuss the difficulties of publishing this paper in the early 1970s. However, it is time to move on. Today we have improved interdisciplinary understanding of waste management processes, more robust numerical tools with better scientific underpinnings, and better access to credible waste management data. Nevertheless, especially in the landfill regulatory & policy arena, we still rely on a variety of outdated concepts, tools & databases developed many decades ago, often for different applications. More disturbing, as applied today, some tools can actually circumvent best engineering practices and site-specific judgment. We can do better. Many of us, including myself, got into the field of waste management by accident; nevertheless, we can all bring our own scientific tools, ideas & strategies to the toolbox. Improve the science. Have fun."

Prof. Jean Bogner delivering her speech during the Opening Session of the Symposium.

0956-053X/$ - see front matter © 2013 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.wasman.2013.10.017

A moment from the Opening Session in the main Conference Hall.

Reports on the several activities held throughout the weak by the IWWG Task Groups are available in the IWWG News & Views pages on this and future issues of Waste Management.

This year's Sardinia Closing Session, held on Friday 4th October from 15.30–17.30, focused on 'The Role of Education in Waste Management' and was opened by Prof. Hiroshi Takatsuki, who focused on an analysis concerning beverage containers, plastic packaging, kitchen waste (food waste), disposable paper products, clothes, electric appliances and hazardous waste (batteries, medical waste). Prof. Takatsuki showed the results of his research presenting photos of waste and revealed the ironies of our lifestyle through his cartoons.

As he correctly pointed out: "Although emphasis has been placed on 3R (Reduce, Reuse and Recycle) in order to solve the waste problem, there are still problems in recycling. The concept of Extended Producer Responsibility (EPR) is being gradually introduced and efforts involving partnership for 3R actions are under way. We have to review our lifestyle to aim for a truly sustainable society".

Hiroshi Takatsuki delivering his speech during the Closing Session of the Symposium.

The following discussion was coordinated by Prof. Rainer Stegmann, Hamburg University of Technology (DE). Prof. Stegmann summarized the main concepts emerged as follows:

"The implementation of appropriate waste management concepts is not often a question of having the appropriate technology but of acceptance, and in order to reach a decision on the acceptance or non-acceptance of a particular technology knowledge is a prerequisite.

For this reason, high levels of education in WM are essential, not only in schools, universities but also in NGOs, the public and private sector, trade and commerce and industries in industrialized as well as in developing countries."

During the closing roundtable highly experienced international experts from universities, international organizations as well as the public and private sector discussed how education in WM can be improved and how to get better access to the existing information material. Another question was what kind of new and proven education forms may be appropriate depending on the specific situation. Participants to the Round Table discussion included:

- Luis Diaz, CalRecovery, Inc. (US).
- Sofía García-Cortés, GIZ Deutsche Gesellschaft für Internationale Zusammenarbeit (DE).
- Jutta Gutberlet, University of Victoria (CA).
- Rainer Stegmann, Hamburg University of Technology (DE).
- Ian Williams, University of Southampton (GB).

Awards

Six best paper awards were assigned during the Symposium and delivered to recipients in occasion of the Gala Dinner:

- Best Brazilian Paper Award: "Geogrid mechanical damages due to recycled construction and demolition wastes", by F.A.S. Barbosa and E.C.G. Santos (Polytechnic School of the University of Pernambuco, Brazil).
- Luigi Mendia Award for the best paper on waste management policy: "Ways and entanglements of the waste hierarchy", by A. Bartl (Vienna University of Technology, Austria).
- Kriton Kuri Award for the best paper on developing country waste management issues: "A close view of waste management in Africa: the 'Africa and its derivates' project", by M.C. Lavagnolo and S. Failli (University of Padova, Italy).
- Giovanni Bozzini Award for the best Italian paper: "Biological hydrogen and methane productions from organic fractions of MSW with different composition", by L. Alibardi and R. Cossu (University of Padova, Italy).
- Alberto Rozzi Award for the best paper on biological treatment: "Enhancing methane production during two-phase anaerobic digestion of food waste by reutilizing hydrogen and carbon dioxide produced in acidogenic leach bed reactor" by B. Yan, A. Selvam and J.W.C. Wong (Hong Kong Baptist University, Hong Kong).
- Best Poster Award: "Plasma technology for the abatement of pollutants emitted by mechanical-biological treatment plants" by M. Ragazzi, E.C. Rada, V. Torretta and M. Schiavon (University of Trento, Italy).

The recipient of the eight edition of the "Life for Waste" Award, presented every two years to individuals who have made an outstanding contribution to advances in international waste management, was given to Prof. Jean Bogner. The Award was presented by Debra Reinhart, from the University of Central Florida.

Jean Bogner is a Research Professor at the University of Illinois at Chicago (UIC). Formerly, she worked at Argonne National Laboratory for more than 20 years. She has more than 35 years research experience and extensive publications related to landfill gas generation, emissions, migration, recovery & utilization. Commercial work has included numerous US and international landfill gas recovery projects, including Clean Development Mechanism (CDM) projects in developing countries. She was the Coordinating Lead Author (CLA) for the chapter on Waste Management for the

2007 IPCC (Intergovernmental Panel on Climate Change) 4th Assessment Report.

Social events

As usual, Symposium participants were able to enjoy a detailed social programme throughout the five days of the conference: from the traditional welcome cocktail to the Gala Dinner that closed the Symposium. Following the huge success of the show in the 2009 and 2011 edition, another "Sardinia's Got Talent" evening was organized, where delegates attending the Symposium came up on the stage and performed singing and playing music. The traditional football match was extremely popular this year, with several teams taking part in a mini-tournament.

Moreover, three guided excursions plus a night tour of Cagliari were arranged during the week to enable Symposium participants and accompanying persons to discover the beauty of the Sardinian territory. These were some of the many opportunities to have fun even in the highly scientific context of the Sardinia Symposium!

The next edition of the conference has been scheduled for October 2015, once again in the traditional venue of Forte Village Resort. The relevant information will be available in due time at the usual website: http://www.sardiniasymposium.it/.

Proceedings from the Sardinia 2013 Symposium are available in the following formats:

- CD
- Printed volume + CD
- Access codes to reserved area on Symposium website

For detailed costs and availability please email the Organizing Secretariat at: info@eurowaste.it or info@sardiniasymposium.it

PowerPoint slides of papers presented during the Symposium will soon be made available in the members' area of the IWWG – International Waste Working Group website (www.iwwg.eu), together with PowerPoint presentations and proceedings of all past IWWG conferences.

For further information please contact the General Secretariat at info@iwwg.eu.

IWWG task group on landfill aeration activities during Sardinia 2013 Symposium by Macro Rizkowski

The IWWG Task Group on Landfill Aeration organized a workshop in the framework of the 14th International Waste Management and Landfill Symposium in Sardinia, Italy. Based on the scientific discussion and publications in the field the Group has identified specific tasks of major interest. These tasks comprise, amongst others, the behavior of heavy metals during landfill aeration. Available data have been evaluated and structured in order to provide some indications on a potential mobilization or fixation of metals in the course of aeration projects. In addition to the behavior of heavy metals, further processes are to be considered. This includes organic carbon degradation, changes in the solid waste characteristic, settlements devolutions and temperatures. Information from full and lab scale aeration projects have been evaluated and compiled in a database 'Landfill Aeration'. On Friday morning, 4 October 2013, approximately 25 participants attended the first part of the workshop and contributed towards a lively and constructive discussion.

Following a short introduction on the background, aims, objectives and important outcomes of the Task Group so far (e.g. the IWWG Monograph Series volume "Landfill Aeration", edited by Rainer Stegmann and Marco Ritzkowski), a first introductory presentation by the Task Group Leader (Marco Ritzkowski, Hamburg University of Technology, Germany) provided an overview on aeration technologies and fundamental processes to occur in landfills during in-situ aeration. Published results indicate the almost instantaneous transmission from anaerobic into aerobic conditions, a time depending quota of biological oxygen consumption in connection with an accordant CO_2 production, an intensive thermal energy generation associated with a significant warming of the landfilled waste as well as improved leaching characteristics (in terms of organic and inorganic nitrogen compounds) of the biological stabilized waste material. At the same time, limited data have been published on the behavior of heavy metals during aerobic in situ stabilization. In this connection Gülsen Öncü from the University of Stuttgart, Germany, presented the intermediate results of the accordant task she is currently leading. As expected, both the oxidation–reduction potential and the pH value have a high impact on the mobilization of heavy metals. During landfill aeration; however, waste pre-stabilisation has to be taken into consideration thus metals mobilization will be significantly attenuated.

Christian Brandstätter (Vienna University of Technology, Austria) presented the status quo and future aims in connection with the landfill aeration database. So far only a limited number of data sets are available and at the same time the comparability of the data is restricted. One of the major deficits is the lack of a common denominator for different aeration projects. During the discussion among the workshop participants it became obvious that there is a demand for a list of standard parameters and measurements that ought to be included in new aeration projects. Existing data should be standardized and harmonized in order to ensure a wider comparability. These aspects will be included in the proceeding work on the task "Landfill aeration database".

During the second part of the workshop the focus was set on the fate of nitrogen during landfill aeration. Applying aeration to a landfill has a significant impact on the accordant leachate quality. However, simulation experiments in laboratory scale often do not adequately consider the conditions to arise when aeration is performed at a full scale landfill. One of the major factors to determine the leachate composition during aeration is temperature. Raising temperatures stimulate/intensify both, nitrogen mineralization rates (ammonification) as well as bioconversion of organic compounds. In consequence pH values are increasing and becoming the major driver of further processes. Due to a shift in the ammonium–ammonia equilibrium (towards free ammonia) nitrification processes are further inhibited and the same applies for microbial bioconversion processes of organic compounds. With the beginning of NH_3–N volatilization both, organic and nitrogen compounds in the leachate are reduced. Furthermore, with the transition into the long term cooling phase (at reduced microbiological activity) the positive impact of aeration on the leachate composition (quality) becomes apparent. The question of a potential long term release of ammonium nitrogen (incorporated in the microbial biomass) once the aeration has been completed seems to be circumstantial. Investigations in laboratory scale indicate that the nitrogen mineralization rates (ammonification) after a widely bio-stabilization are in a range of 30% in comparison with the situation at the start of aeration. In any case leachate concentrations (ammonium nitrogen) are expected to adjust at low levels after completion of aeration.

Marlies Hrad from the University of Natural Resources and Life Sciences, Vienna, Austria presented an overview on the nitrogen dynamic including possible pathways of N-transformation/removal during landfill aeration. On the basis of available results from task group members she raised the question if we are able to set up a complete nitrogen balance for an aerated landfill and which additional value would be associated with such a balance? During the presentation as well as in the subsequent discussion it became clear that both experimental and analytical difficulties

prevent from balancing the nitrogen dynamic so far. There was a consensus among the participants that the development and application of a standard lab test procedure may be a promising tool in order to overcome some of the problems. Furthermore, a more detailed characterization of the nitrogen pool contained in the waste mass (organic or inorganic nitrogen, specific compounds, etc.) in combination with an identification of the individual conversion rates of different N-transformation processes may contribute towards a better understanding of the nitrogen dynamic during landfill aeration.

The final presentation about the intermediate results of the task on "Temperature development during landfill aeration" was provided by Thomas Wohlhuter (Arcadis, France). This task is of particular importance since increased temperatures are not only a concern in connection with potential waste self-ignition but also driving several reactions, e.g. the ammonification and nitrification processes inside the aerated waste mass. The heat balance is mainly based on three major elements, namely the microbial heat generation as well as thermal energy injection and discharge through aeration and off-gas extraction. In consequence, well-adjusted aeration rates (in particular during the early stages of aeration) and possibly intermittent aeration modes may contribute towards an effective temperature control.

To conclude, the dynamics of the discussion during the workshop underlined the remarkable interest shown towards landfill aeration. The possibility of bio-stabilizing closed MSW landfills has already been implemented into the German and Austrian legislation and approved CDM methodologies demonstrate that in-situ aeration contributes towards climate protection. Tasks for the near future exist with a standardisation of both lab and full scale aeration procedures as well as a better understanding of specific processes involved in the bio-stabilization.

The next regular meeting of the Task Group is scheduled for October 2014 in the framework of the 8th Intercontinental Landfill Research Symposium ICLRS 2014 in Florida, USA.

For further information on how to join the Task Group and actively contribute to any of the above mentioned issues please contact the Task Group Leader Marco Ritzkowski (e-mail: m.ritzkowski@tuhh.de) or visit the TG website (http://www.iwwg.eu/task-groups.html).

For further information on IWWG activities, please:

- Access the IWWG Website: http://www.iwwg.eu
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