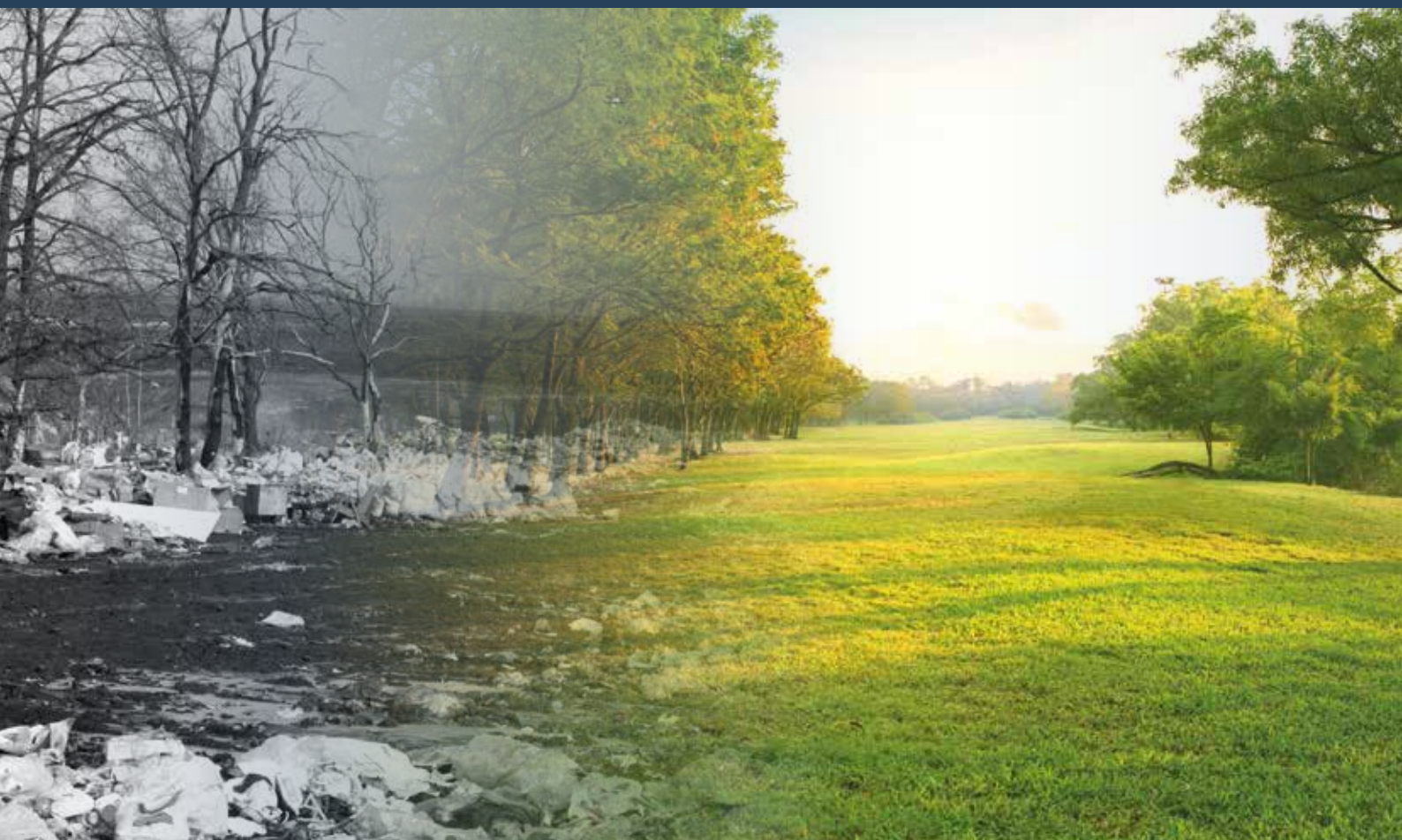


FIRST SEMINAR ABOUT ENHANCED LANDFILL MINING 20 OCTOBER 2015 EUROPEAN PARLIAMENT



CONTENT TABLE

INTRO	5
INTRODUCTION	6
ORGANISING ACTORS	8
EURELCO	10
PROGRAMME	13
EC PARTICIPANTS	14
PRESENTATIONS	16
VIDEOS	20
PARTICIPANTS	22
CONCLUSION	24
PHOTOS	26



VINCENZO GENTE

EC, DC RTD

“ELFM requires the development of a systemic approach to innovation that gathers together all interested actors, goes across sectors, and involves all forms of innovation. This broad approach to innovation for a sustainable society is very much in line with the objectives of the Circular Economy Package presented by the European Commission on 2 December 2015, that, among the others, recognises the possibility of recovering critical raw materials from landfill. Through the Horizon 2020 2016-2017 call for proposals on “Industry 2020 in the circular economy” the European Commission will invest over €650 million in innovative demonstration projects. This investment is meant to support a systemic approach to innovation that helps realise the objectives of the circular economy and industrial competitiveness.”



FIRST SEMINAR ABOUT ENHANCED LANDFILL MINING 20 OCTOBER 2015 EUROPEAN PARLIAMENT





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“The recuperation of the stored waste materials and the underutilised space no longer represents an unrealistic scenario.”

Joke Schauvlieghe



The transition towards a circular economy is a clear choice. In this context we do not only pay attention to the production and products of the future but we also take into account the remnants of our past. The historical landfills constitute a good example of this. With the approval on 16 October 2015 of the concept note concerning the sustainable management and mining of landfills (ELFM² - Enhanced Landfill Management & Mining), the Flemish Government has put this principle into practice.

Since many years the Region of Flanders has been one of frontrunners with respect to the recycling of waste (more than 70% of household waste and 74% of industrial waste is being recycled). Less than 2% of this waste is deposited in landfills (compare with the EU average: 48%). These successful results have led to a situation where Flanders currently only operates 28 permitted landfills (anno 2015).

On the other hand, there are 2,033 historical landfill sites for which no or only basic plans exist for their sustainable use. In many cases the attention is limited to the aftercare phase.

Recent research has demonstrated that landfills can offer more than just representing a potential contamination source or an abandoned site. The recuperation of the stored waste materials and the underutilised space no longer represents an unrealistic scenario. The technological developments and the strong needs for materials and a viable environment make it possible that landfill sites become potential solutions rather than a threat.

The concept "Sustainable Materials Management" incorporates the vision that today's waste materials (Urban Mining) and those of the past (Landfill Mining) should become the raw materials for a green, circular economy. With the development of ELFM² (Enhanced Landfill Management & Mining) Flanders will become the first region in the world where landfills are managed sustainably, in view of the potential valorisation of their content and optimised spatial planning. Together with its diverse partners, OVAM (the Flemish Public Waste Agency) will implement this vision.

Joke Schauvlieghe

Flemish Minister of Environment, Nature and Agriculture

“

“Trash is cash, said first Vice-President Timmermans at the Commission’s stakeholders’ conference on circular economy last June. I fully agree.”

Circular economy is really dominating the agenda of the Parliament. There are various conferences, seminars and events on a daily basis. It is very clear that the Parliament is gearing up towards the end of this year, when the Commission is expected to publish its new proposals on circular economy⁽¹⁾. “Trash is cash”, said first Vice-President Timmermans at the Commission’s stakeholders’ conference on circular economy last June. I fully agree. Raw materials are one of the most important cost drivers for production. Hence, discarding such valuable resources does not make any sense. Not from an ecological, societal or economic point of view. Moreover, the EU is in a precarious position since it is highly dependent on the import of raw materials and a significant number of natural resources face rapid depletion. Nonetheless, overall every EU citizen produces five tonnes of waste per year on average - this equals the weight of an adult African elephant - of which only one third is recycled.

This makes the transition to a circular economy crucial. Apart from the important intrinsic environmental benefits, making our economy more circular essentially boils down to economics and competitiveness. It concerns access to - or the sustainable availability of - raw materials, the re-industrialisation and further digitalisation of Europe, the creation of new jobs and challenges linked to climate, energy and scarce resources.

If we genuinely want to boost European competitiveness and hence contribute to growth, prosperity and wellbeing, we need to urgently unlock the strategic stock of resources and use them in a more sustainable and efficient way. Many businesses already invest in innovative models and techniques to close the loop, because the circular economy offers an appealing business case. I still consider this to be the most powerful argument to convince non-believers.

⁽¹⁾ The Circular Economy Package [EC Circular Economy Action Plan; COM(2015)614/2] was launched on 2 December 2015.





Mark Demesmaeker
Member of the European Parliament

I am convinced that there is a genuine window of opportunity to make the circular economy work in practice, but we need smart policy which reduces burdens and barriers, stimulates innovation as well as new business models which create long-term legal certainty. For all those reasons, today's seminar on Enhanced Landfill Mining is spot on.

In the Parliament's resolution on circular economy of July 9, a reference to Enhanced Landfill Mining is included, actually one of my amendments in which we ask the Commission to "further investigate the feasibility of proposing a regulatory framework for Enhanced Landfill Mining so as to permit the retrieval of secondary raw materials that are present in existing landfills..." (§40). I indeed believe that Enhanced Landfill Mining offers interesting opportunities for our transition to a circular economy. The nation I represent, Flanders, is a real trendsetter in this area.

Flanders has a strong track record on waste management. 65% of our household waste is recycled, making us the top performer in Europe (EEA data 2013, EU average stands at

35%). Our ambition level is high. In its vision for the future, "Vision 2050" the Flemish government considers the further transition towards a circular economy to be essential.

In October the Environment Minister of the Flemish government announced that Flanders will start with Enhanced Landfill Mining. Flanders has about 2,000 old landfills, which cover a surface of 88 square km. Enhanced Landfill Mining would not only enable us to recover valuable materials and bring them back into the cycle, but also to recover space. There are of course many challenges ahead if we want to turn Enhanced Landfill Mining into a success story: providing transparent information to the public in order to ensure our citizens that we can do this in a safe way is of paramount importance. More information on the concept of Enhanced Landfill Mining, its opportunities and possible caveats are needed. Therefore, I am very much looking forward to the expert contributions and I am convinced that this seminar will help policymakers in making the right decisions for making our economy more circular.





MARK DEMESMAEKER
Member of the European Parliament

BIOGRAPHY

Mark DEMESMAEKER is a Belgian Member of the European Parliament (ECR, N-VA) since 1st February 2013. He is a member of the Foreign Affairs Committee, the Parliamentary Committee for cooperation with Ukraine, and the Parliamentary Assembly Euronest. As a substitute he is a member of the subcommittee on Human Rights and of the Committee on Environment, Public Health and Food security.

Mark started in 1992 as a journalist and was elected alderman in 2007, till 2012, in the City of Halle. Afterwards he was elected as a member of the Flemish regional parliament from 2004 till 2013.

From 2005 till 2007 he was the secretary general of his party N-VA.

"Flanders has a strong track record on waste management. 65% of our household waste is recycled, making us the top performer in Europe (EEA data 2013, EU average stands at 35%). Our ambition level is high. In its vision for the future, "Vision 2050" the Flemish government considers the further transition towards a circular economy to be essential. Last weekend the Environment Minister of the Flemish government announced that Flanders will start with enhanced landfill mining. Flanders has about 2000 old landfills, which cover a surface of 88 square km. Enhanced Landfill Mining would not only enable us to recover valuable materials and bring them back into the cycle, but also to recover space. There are of course many challenges ahead if we want to turn Enhanced Landfill Mining into a success story: providing transparent information to the public in order to ensure our citizens that we can do this in a safe way is of paramount importance."



HILDE VAUTMANS

Member of the European Parliament

BIOGRAPHY



Hilde VAUTMANS is a Belgian Member of the European Parliament (ALDE, Open Vld) since 12 January 2015, as a successor of Mrs Annemie NEYTS-UYTTEBROECK. She is a member of the Foreign Affairs Committee, the Security and Defence Committee and the delegation for relations with the NATO Parliamentary Assembly. As a substitute she is a member of the delegation to the ACP-EU Joint Parliamentary Assembly.

Hilde started her political career at the office of, then Prime Minister, Guy VERHOFSTADT advising him in the fields of foreign and military affairs, external aid and equal opportunities. She was during two legislatures Member of the Belgian House of Representatives, while being the group leader of Open Vld for a while. She switched to being the secretary general of Open Vld in the House of Representatives and from there on joined the EP.

She combines her office as MEP with being an alderwoman in the City of Sint-Truiden, responsible for education, agriculture, military affairs and environment.

"For ELFM to prosper, the European Commission, in alliance with the national and regional Public Waste Agencies, needs to create the legal frameworks, in close collaboration with all stakeholders. ELFM can trigger technological innovation in a circular economy framework. As we also know from several McKinsey reports on the circular economy, the potential for local job creation, including both high and low skilled jobs, is also clear for ELFM. And today we've heard that private businesses are ready to take part in this broadened circular economy model. I will continue to work to make this ELFM programme happen, as I truly believe this wonderful concept offers us a win-win perspective in term of economics, innovation levels, job creation and doing our bit for the environment."

VISION

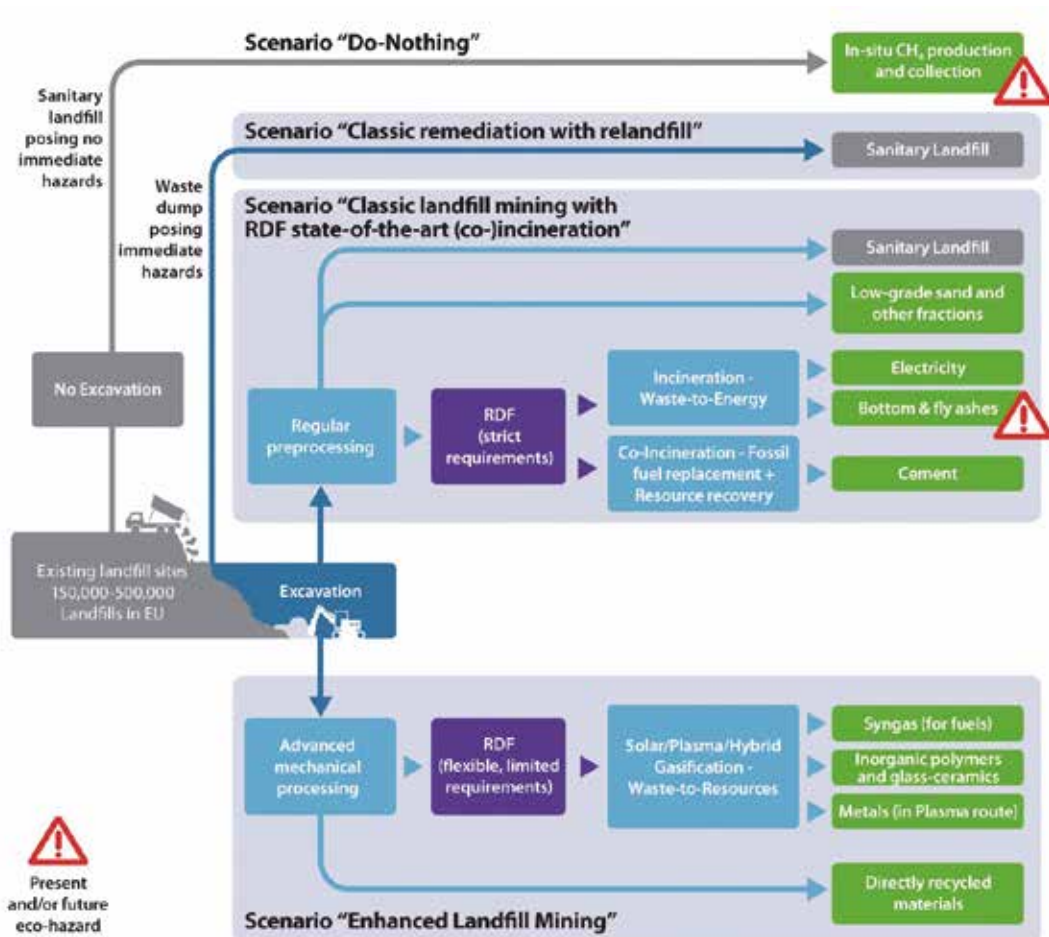
By 2020 Enhanced Landfill Mining is implemented EU wide as a key component of a resource efficient, circular and low-carbon economy. The EU’s 150,000 to 500,000 landfills provide for a substantial part of the EU’s material, energy and land needs. ELFM has paved the way for breakthrough exploration, separation, transformation and upcycling technologies that are also used for recycling/urban mining of newly produced waste and residues.

MISSION

The European Enhanced Landfill Mining Consortium (EURELCO) is an open, quadruple helix network that supports the required technological, legal, social, economic, environmental and organisational innovation with respect to Enhanced Landfill Mining within the context of a transition to a resource efficient, circular, low-carbon economy.

EURELCO is a network that:

- maps and shares information on the current level and future potential of Enhanced Landfill Mining (ELFM) projects and programmes in the EU’s Member States;
- further elaborates Enhanced Landfill Mining and integrates it with both traditional recycling/urban mining and other landfill mining concepts such as temporary storage places, bioreactors and sustainable landfilling;
- keeps track and stimulates the innovation in science and technology for exploration, excavation, separation/recovery and transformation/upcycling in view of improved resource utilisation efficiency;
- analyses national and EU Landfill and Waste/Materials Management legislation and develops policy guidelines for improved legislation frameworks (revised EU Waste Hierarchy) and economic incentives in line with the expected public benefits of ELFM;
- develops and applies scientifically based methods for evaluating ELFM in terms of social, environmental and economic impacts, from a local and regional to global perspective;
- develops and executes ELFM research, demonstration and coordination projects;
- disseminates the technological and non-technological features of ELFM to a diversity of audiences.





PETER TOM JONES
General Coordinator EURELCO

BIOGRAPHY

Dr. Peter Tom Jones is a Senior KU Leuven Industrial Research Manager in the field of Urban/Landfill Mining and Sustainable (Inorganic) Materials Management. He is coordinator and/or valorisation officer of a number of KU Leuven, Flemish and EU-wide projects, programmes and consortia in the field of recycling, metallurgy and Urban/Landfill Mining (e.g. SIM² KU Leuven, RARE³ KU Leuven, FP7 MC-ITN EREAN, H2020 MSCA-ETN RED-MUD, H2020 MSCA-ETN DEMETER). With a PhD background in metallurgy he is the author of more than 50 peer-reviewed papers on recycling, metallurgy, Urban/Landfill mining. As a Research Manager driven by the principles of Responsible Research and Innovation (RRI) he has also lectured to a wide diversity of non-scientific audiences and he has written almost 10 books in the field of sustainability, transition management and integrated climate change policies. Since January 2012 he is the President of i-Cleantech Flanders. In March 2014 he was elected as the General Coordinator of the European Enhanced Landfill Mining Consortium (EURELCO). Together with Group Machiels he is also the founding father of the International Enhanced Landfill Mining Symposia.

54 ORGANISATIONS FROM 12 EU MEMBER STATES ARE UNITED IN EURELCO IN DECEMBER 2015.



MORE INFO





The motivation to organise the first ELFM Seminar in the European Parliament can be brought back to the official answer of the EC (28-7-2015) to a written Parliamentary Question (E-007864/2015) about Europe's views on ELFM. In its response the European Commission admitted that it does not yet have a clear strategy with respect to its landfills and their potential mining/remediation, and it has not performed any cost estimates of the total landfill-remediation bill. This response corroborated the need for a dedicated Seminar where ELFM and landfill experts would present their views on the landfill mining concept, while initiating a fruitful dialogue with Members of the European Parliament and the different involved DG's of the European Commission (DG GROW, DG RTD, DG ENERGY, DG ENVIRONMENT). As such, a comprehensive programme was set up by the two organising Members of the European Parliament (Hilde Vautmans and Mark Demesmaeker) and key EURELCO actors. In line with the principles of Responsible Research and Innovation much care was taken to involve a wide variety of stakeholders in the keynote lectures and the two panel debates. In this way, key representatives of industry, academia, EU and national policy makers were invited to share and discuss their views on the merits and pitfalls of ELFM, both with respect to Municipal Solid Waste and Industrial Residue landfills.

PROGRAMME

- **INTRODUCTION BY MARK DESMESMAEKER (MEP, ERC)**
- **ENHANCED LANDFILL MINING IN THE EU-28 BY DR. IR. PETER TOM JONES (PRESIDENT EURELCO)**
- **INDUSTRIAL RESIDUE LANDFILLS AND ELFM BY PROF. BERND FRIEDRICH (RWTH AACHEN)**
- **DEBATE ON ELFM FOR INDUSTRIAL RESIDUE LANDFILLS IN VIEW OF EU SUPPLY RISK FOR CRITICAL METALS**
 - Prof. Bernd Friedrich (RWTH Aachen)
 - Prof. Egbert Lox (Umicore)
 - Magnus Gislev (EC, DG GROW)
 - Vincenzo Gente (EC, DG RTD)
 - Eddy Wille (Flemish Public Waste Agency)
- **MSW LANDFILLS AND ELFM: THE CLOSING-THE CIRCLE- CASE STUDY BY YVES TIELEMANS (GROUP MACHIELS)**
- **DEBATE ON ELFM FOR MSW LANDFILLS IN RELATIONSHIP TO THE EU LANDFILL DIRECTIVE**
 - Yves Tielemans (Group Machiels)
 - Rolf Stein (Advanced Plasma Power)
 - José Rizo Martin (EC, DG ENVIRONMENT)
 - Mark Van Stiphout (EC, DG ENERGY)
 - Prof. Roland Pomberger (Montanuniversität Leoben)
 - Prof. Gerhard Rettenberger (FH Trier, Senior Consultant)
- **SUMMARY CONCLUSIONS BY PROF. STEVEN VAN PASSEL (UNIVERSITY OF ANTWERP)**
- **CLOSING REMARKS BY HILDE VAUTMANS (MEP, ALDE)**



ROLAND POMBERGER

Montanuniversität Leoben

"This symposium at the European parliament was a very important step forward because we have some problems in the future with landfills. These problems will occur. We need a sustainable system of technical solutions to solve these problems."



MAGNUS GISLEV
EC, DC GROW

BIOGRAPHY

Magnus Gislev has a Master of Sciences degree from his native country Sweden. He started at the European Commission in 1995.

In 1999 he joined the Environment Directorate-General of the Commission and from 2005 to 2009 he was Environment Counsellor at the European Union Delegation in China. He then worked in the International Relations Unit of the Environment Directorate-General.

Since 2013, he is in the Internal Market, Industry, Entrepreneurship and Small and Medium-sized Enterprises Directorate-General of the Commission where he is in charge of resource efficiency policies within the EU's Raw Materials Initiative.

"The potential of enhanced landfill mining will ultimately depend on the market - whether it can be a profitable business or not. Initial inventories work, like the one done by EURELCO is a useful starting point to assess enhanced landfill mining. The new Horizon 2020 SMART GROUND project will also help develop an EU-wide secondary raw materials inventory as far as landfills are concerned. Acceptance by local communities is also crucial. To this end, in addition to properly disseminating reliable information, authorities concerned must ensure the full respect of EU rules on environmental impact assessments, public participation etc."



VINCENZO GENTE

EC, DC RTD

BIOGRAPHY

Vincenzo Gente joined in 2010 the European Commission, where he is now a Policy Officer in the Eco-innovation Unit of the Climate Action and Resource Efficiency Directorate of Directorate General Research and Innovation. He is responsible for the management of specific thematic areas and the support of horizontal activities, providing contribution to the technical orientation and to the development of relevant programmes or policies. His main areas of interest are systemic eco-innovation and circular economy. After the PhD in Raw Material Engineering and Environmental Protection at University of Rome La Sapienza, he gained relevant professional experience both in research and private sectors. At University of Rome La Sapienza he has been a fellow researcher. His research fields are related to waste and remediation technologies and characterisation of particulate solids. In the private sector, as a consultant for an international environmental firm, he managed and participated in projects regarding environmental impact assessment studies, technical due diligences and the remediation of contaminated sites. At University of Rome La Sapienza he has been also teaching "Safety and environmental protection in solid treatment". He is author of several publications in international journals and conference proceedings. He is editor of the e-book "Separating Pro-Environment: Technologies for Waste Treatment, Soil and Sediments Remediation".

"ELFM is a concept that includes environmental, social, and economic aspects, e.g. land reclamation and use, awareness and acceptability of communities, and recovery of raw materials. It does not only deal with waste management, but with the creation of economic opportunities that, at the same time, improve the environment and preserve resources. ELFM requires, therefore, the development of a systemic approach to innovation that gathers together all interested actors, goes across sectors, and involves all forms of innovation.

This broad approach to innovation for a sustainable society is very much in line with the objectives of the Circular Economy Package presented by the European Commission on 2 December 2015, that, among the others, recognises the possibility of recovering critical raw materials from landfill. Through the Horizon 2020 2016-2017 call for proposals on "Industry 2020 in the circular economy" the European Commission will invest over €650 million in innovative demonstration projects. This investment is meant to support a systemic approach to innovation that helps realise the objectives of the circular economy and industrial competitiveness."

UNLOCKING THE RESOURCE POTENTIAL IN EUROPE'S 500,000+ LANDFILLS

Peter Tom Jones, General Coordinator EURELCO

Since the earliest days of the Industrial Revolution, Europe has been dumping large quantities of its unwanted waste materials in landfill sites. Previous estimates have suggested that there are somewhere between 150,000 and 500,000 such sites, either closed or still operational, in the EU-28⁽¹⁾. However, a bottom-up inventory, assembled by EURELCO and presented during this first ever ELM Seminar in the EP, shows that the 150,000-500,000 figure is most likely an underestimation. This exercise has also highlights that most of the still-operational landfills are "sanitary" landfills, which are equipped with state-of-the-art environmental protection technologies and methane collection systems. However, at least 90% of Europe's landfills are "non-sanitary" landfills, which predate the EU's Landfill Directive (1999)⁽²⁾. These landfills have limited, poor or no protection technologies. To avoid environmental and health effects, remediation measures will be needed in the short-to-medium term. However, classic remediation costs for the EU-28 as a whole have been estimated to be as high as €100 billion to €1 trillion⁽³⁾.

ELFM

Fortunately, the "Enhanced Landfill Mining" concept provides us with a game-changing solution. ELM is "the integrated valorisation of landfilled waste streams as materials and energy, using innovative transformation and upcycling technologies and respecting the most stringent social and ecological criteria⁽⁴⁾". ELM is relevant for both Municipal Solid Waste landfills and so-called "mono-landfills", containing one specific type of a metal-containing industrial residue. In the case of MSW landfills, the outputs of ELM can be fuel-grade H₂ and alternative binders for low-carbon construction applications. Industrial residue landfills can be mined for their metals, while the mineral residues can be transformed into low-carbon building materials. Such an integrated strategy would drastically reduce landfill remediation costs, regain valuable urban land and recover billions of tonnes of previously abandoned materials.

ELFM and EU-28

Despite the growing interest in ELM, much needs to happen to trigger its EU-wide implementation. As demonstrated by the official response of the EC (28-7-2015) to a written Parliamentary Question (E-007864/2015), the EU acknowledges that it does not yet have a clear strategy with respect to its landfills and their potential mining/remediation, and it has not performed any cost estimates of the total landfill-remediation bill for the EU-28. Nor does it have confirmed data on the amount, content, type or ownership situation with respect to its 150,000–500,000 landfills. The bottom-up data of the EURELCO members are currently the only benchmark. To conclude, a vision for Europe's landfills needs to be developed along with a set of innovative technologies that can upcycle the excavated waste into valuable products.

⁽¹⁾W. Hogland et al., *Proc. Int. Acad. Symp. on ELM, 2010, 209-222*; P.T. Jones et al., *Journal of Cleaner Production, 55, 2013, 45-55*.

⁽²⁾Bottom-up inventory assembled by EURELCO: <http://www.eurelco.org/infographic>

⁽³⁾Personal communication Eddy Wille, Flemish Public Waste Agency.

⁽⁴⁾Based on P.T. Jones et al., *Journal of Cleaner Production, 55, 2013, 45-55*.





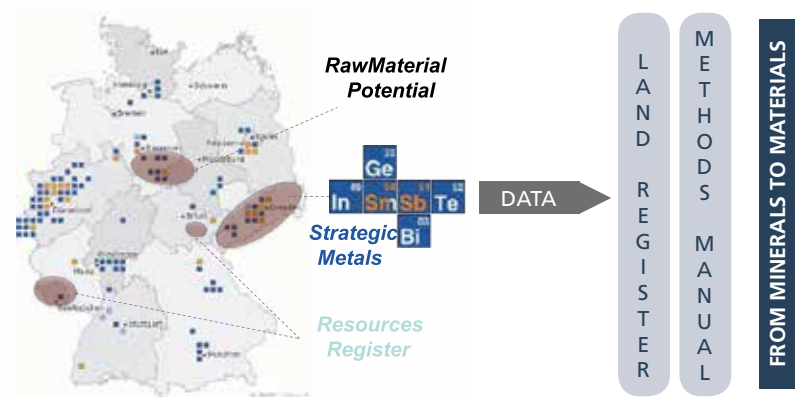
BERND FRIEDRICH
*Institute director IME
 RWTH Aachen*

BIOGRAPHY

Prof. Dr.-Ing. Dr. h. c Bernd Friedrich is the Institute director of the IME Process Metallurgy and Metal Recycling of Technical University Aachen (RWTH Aachen) is Europe's leading institute for process metallurgy and metal recycling., Senior lecturer, principal investigator, with extensive experience in R&D of hydrometallurgy and pyrometallurgy, including approx. 200 publications and the development of commercial materials with industry. Has supervised one professorial work, 50 doctoral works, currently 24 doctorate candidates and 4 postdocs. Supervisor in H2020 MSCA-ETN REDMUD.

Unlike China, Russia or South-Africa, the EU-28 Member States are not gifted with vast, easily accessible ore deposits containing (critical) metals. Nevertheless, Europe does have substantial amounts of so-called "monolandfills" containing one type of industrial process residue (such as bauxite residue (red mud), goethite, phosphogypsum, or other types of metallurgical tailings, sludges and slags). These landfills often contain significant concentrations of both economically important (base) metals and critical metals (indium, germanium, antimony, rare-earths etc.). Although the classical definition of Enhanced Landfill Mining (ELFM) – "the integrated valorisation of landfilled waste streams as materials and energy, using innovative transformation and upcycling technologies, and respecting the most stringent social and ecological criteria"⁽¹⁾ – was mainly developed for landfills rich in Municipal and Urban Solid Waste, it can also be adapted to the mining of these mono-landfills. However, traditional hydro- and pyrometallurgical processes are not capable of economically recovering these metals. Therefore, "new metallurgical systems", which combine hydro- and pyro- with plasma-, bio- and solvo-metallurgy, are required. Such an approach implies that one goes beyond a simplistic metal-centric approach, in which only the most valuable critical metals are extracted and the residual matrix (typically more than 95-99 wt%) is landfilled again, thus simply shifting the problem. Contrastingly, RWTH has been a pioneer, along with several of its EURELCO partners, in developing a zero-waste, "product-centric" approach. This systems approach allows to recover both critical and base metals, while simultaneously finding solutions for the residual mineral matrix, ranging from high-quality aggregates, to alternative binders (Supplementary Cementitious Materials and geopolymers) or even novel catalysts. The technology that is developed for these monolandfills is, furthermore, also of interest to treat freshly produced streams of industrial residues.

THREE CURRENT GERMAN "R3-HALDENCLUSTER" PROJECTS - AIMS



Source: BMBF-v3 Abschlusskonferenz, Bonn, 15./16. 9. 2015



⁽¹⁾PT. Jones et al., *Journal of Cleaner Production*, 55, 2013, 45-55.



YVES TIELEMANS
*Business Unit Manager
 Closing the Circle
 Group Machiels*

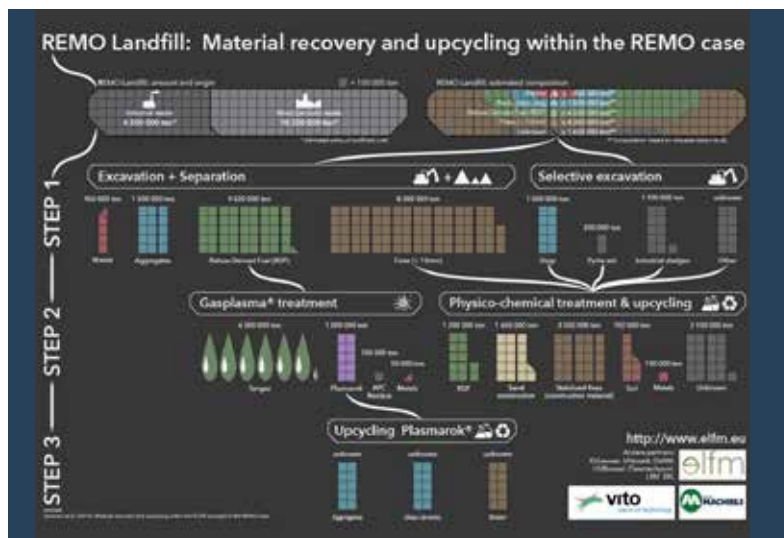
BIOGRAPHY

Yves holds a Master's Degree in Physics (1999, KU Leuven Belgium) and an additional Master's degree in Project Management (2009). He is also PMP® Certified by PMI® (2009). Within Group Machiels he is a seasoned Business Unit and Program Manager leading the implementation of the Enhanced Landfill Mining concept and more specific Group Machiels' Closing the Circle project by establishing a quadruple helix network that supports the required technological, legal, social, economic, environmental and organisational innovation. He was Project Coordinator of the Flemish IWT O&O CtC project, organiser of the International Academic Symposia on Enhanced Landfill Mining and editor of the accompanying Symposium books.

Group Machiels is a leading enterprise in the development and implementation of Enhanced Landfill Mining and a reliable provider of sustainable Waste Solutions. Their 'Closing the Circle' project at the REMO landfill site in Belgium is envisaged to be the 1st implementation of ELFM worldwide. The 1st phase features a Plasma Demonstration Plant (2018) implementing at an industry relevant scale the innovative chain of technologies demonstrating the technical and economic viability of the ELFM concept. A sustainable implementation requires innovation in:

- technology in order to upcycle waste streams into high added value products;
- business models when migrating from a linear to a circular economy application;
- organisation by forming an industrial consortium to bring together the know how and funds and to valorise the ELFM concept worldwide;

while at the same time applying the quadruple helix model in order to create awareness, buy in and the necessary frameworks by bringing together industry, governments, research institutes and civil society actors.



“DIGGING FOR GARBAGE” WITH RAY COKES

Digging for garbage is a short documentary/animation film intended for a wide audience to raise awareness with respect to the benefits of Enhanced Landfill Mining. The lead role is played by former MTV Star Ray Cokes and currently mainly known from his lead role in Belgium’s Got Talent. As he walks through a beautiful piece of nature, whilst picking flowers, he realises that in life nothing is what it seems! Then he gets into an excavator and starts digging having the best fun he’s ever had. The beautiful piece of nature reveals an old landfill site, with tonnes and tonnes of waste from the 1960s and 1970s. In Europe, there are half a million of these old landfills, usually hidden under streets, forests or lawns. The vast majority of these landfills pose a long-term threat to our environment and our health. But, according to Ray Cokes, there is hope. The old waste is a wonderful opportunity for doing things better and moving towards a low-carbon circular economy in Europe. Through new technologies, such as the revolutionary gas-plasma technology, 100% of all that old waste can be recycled and even upcycled. You heard it right: 100%. And, as Ray Cokes is a true hedonist, that calls for a party! But never party alone. For the first time ever a fanfare enters the bowels of a semi-excavated landfill, providing some incredible and unforgettable scenes.



EGBERT LOX

Umicore

“I was very happy to be part of the panel and part of the contributors. It’s really necessary that the European Union starts the initiative on the landfill mining. I like the enthusiasm but at the same time it brought some realism with respect to the expectations on content of materials that we can get out. Our legacy doesn’t go away by not looking at it. We have to attack this with a realistic time.”

VIDEO REPORT ENHANCED LANDFILL MINING SEMINAR

On 20 October 2015 the European Parliament hosted the first ever Enhanced Landfill Mining Seminar where the merits and pitfalls of landfill mining were discussed by all major stakeholders, including representatives of the European Parliament, the European Commission, national public bodies, academia and industry. In order to summarise the event, a short, 5 minute documentary film was produced, which provides unique footage of the keynote lectures, images of the vast audience in the Parliament, along with unique interviews with the organising Members of the European Parliament (Hilde Vautmans & Mark Demesmaeker) and quotes from several speakers during the event. Looking at the smiling faces of all these interviewed people, it's clear that this event was a major success and a key milestone for ELFM.



ANJA MAUL
RWTH Aachen University

“Enhanced Landfill Mining can provide benefits for a circular economy and it is good to see that this is approvingly noticed by Europe’s resource community. Several pilot projects proved a technical feasibility for resource and energy recovery through landfill mining. Now, it is more a question of how this fits into the existing waste management plans of each EU member state. This question has to be answered within future ELFM research projects.”

ORGANISATION	FIRST NAME	LAST NAME
Advanced Plasma Power	Robert	Johnson
Advanced Plasma Power	Rolf	Stein
Aenergyes	Renaud	De Rijdt
Air Liquide	Peter	Calcoen
Antea Group	Kurt	Bouckenooghe
Associatie KU Leuven	Lieven	Machiels
Ballast Nedam	Lars	Cuyvers
Bouwen en Milieu	Maarten	Dingenen
Bouwen en Milieu	Kristof	Neven
Bouwen en Milieu	Willy	Parent
Bouwen en Milieu	Filip	Vautmans
BSV	Wouter	Moors
BULK .ID	Bart	Vanpoucke
Busschers Recyclingtechniek	Jarno	Busschers
Cardiff University	Talib	Mahdi
CERENA, University of Lisboa	Maria	João Pereira
CleanTechPunt	Maurice	Ballard
CRH Sustainable Concrete Centre	Peter Joannes	Van Mierloo
Dansk Affaldsforening	René	Möller Rosendal
De Coster	Tom	De Coster
Ecorem	Astrid	De Man
Envirotis Holding	Palma	Paroczy
European Parliament	Angelique	Vandekerckhove
European Parliament	Karl	Van den Bossche
European Parliament	Katrien	Uytttersprot
European Parliament	Marida	Digilamo
European Parliament	Slavko	Solar
ERM	Thomas	De Romagnoli
European Aluminium	David	Van Heuverswyn
European Commission	Mark	Van Stiphout
European Commission	Janneke	Van Veen
European Commission	Marco	Recchioni
European Commission	Magnus	Gislev
European Commission	Vincenzo	Gente
Fraunhofer Project Group IWKS	Adriana	Sanz Mirabal
Grant@vice	Danielle	Baetens
GreenWin	Fredericq	Peigneux
Gresea	Romain	Gelin
Grontmij	Hans	Mory
Group Machiels	Daneel	Geysen
Group Machiels	Guido	Hermans
Group Machiels	Louis	Machiels
Group Machiels	Fabienne	Soetaers
Group Machiels	Yves	Tielemans
Group Machiels	filip	Vercauteren
Group Machiels	Lode	Willems
Hasselt University	Rob	Hoogmartens
Headline	Jeroen	Mortier
Hinicio	Wouter	Vanhoudt
i-Cleantech Vlaanderen	Katleen	Vandormael
I-Cleantech Vlaanderen	Annick	Vastiau
i-Cleantech Vlaanderen	Bart	Vercoutere
IME Process Metallurgy and Metal Recycling	Bernd	Friedrich

PARTICIPANTS

ORGANISATION	FIRST NAME	LAST NAME
Indaver	Guy	Roosenbroeck
Indaver	Kristien	Schoonjans
ING	Peter	Van Eindhoven
ING	Martine	Vansweevelt
Ingenieurgruppe RUK GmbH	Gerhard	Rettenberger
J.M. Recycling	Peter	Driesen
J.M. Recycling	Fanny	Machiels
KU Leuven	Guo	Muxing
KU Leuven	Karel	Van Acker
KU Leuven	Bart	Blanpain
KU Leuven	Lieve	Helsen
KU Leuven	Lubica	KRISKOVA
KU Leuven	Lucian	Onisei
KU Leuven	Chengjun	YU
KU Leuven	Peter Tom	Jones
KU Leuven	Arne	Peys
KU Leuven	Lukas	Arnout
Limburgse Investeringsmaatschappij	Roeland	Engelen
Linnaeus University. ESEG group	Juris	Burlakovs
Metallo-Chimique	Mathias	Chintinne
Montanuniversitat Leoben	Roland	Pomberger
OVAM	Eddy	Wille
OVAM	Peter	Nagels
OVAM	Luk	Umans
PMV	Frank	Gerard
POINT Consulting Group	Koen	Sips
POM Oost-Vlaanderen	Tom	Pauwels
Praetica	Valerie	Vandegaart
Provincie Noord-Brabant	René	Beijnen
R20 Regions of Climate Action	Qiuping	LI
REMO MILIEUBEHEER	Robert	VROONEN
RWTH Aachen University	Anja	Maul
Saneco	James	Delanoeye
Shanks	Julien	Brugmans
Sita Treatment & Recycling	Stephane	Noirfalise
Spaque	Claudia	Neculau
Spaque	Marta	POPOVA
Stad Sint-Truiden	Peter	Wiame
Stena Metall Service AB	Hitomi	Lorentsson
Stockholm University	Carl	Österlin
SUEZ	Thibaut	Lifrange
Tractebel Engineering	Geoffrey	Rezer
Umicore	Egbert	Lox
University of Gent	Simon	De Corte
University of Gent	Ellen	Van de Vijver
University of Antwerp	Steven	Van Passel
University of Kent & DVZ	Iqba	Dawari
VITO	Koen	Broos
Kabinet Liesbeth Homans	Victor	Dries
Witteveen+Bos Belgium	Peter	Van den Bossche

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“I will continue to work to make this ELFM programme happen, as I truly believe this wonderful concept offers us a win-win perspective in term of economics, innovation levels, job creation and doing our bit for the environment.”

During the first ever ELFM event in the European Parliament, we have listened to several keynote lectures and animated debates about the pros and, sometimes also, cons of Enhanced Landfill Mining, a concept that has only recently started grabbing the attention of policy makers, including members of the EP and the EC.

In May 2015 I took the initiative to submit a formal Parliamentary Question concerning the position of the EC with respect to the state of Europe’s landfills and the potential benefits of an Enhanced Landfill Mining programme for those waste repositories. The three questions I asked, were:

1. Has the Commission performed any calculations on the future remediation costs for the EU-28?
2. Has the Commission performed a mapping of the resource potential of its 150,000 to 500,000 landfills?
3. Does the Commission plan to support R&D and/or pilot activities, as well as demonstration projects, which explicitly address Enhanced Landfill Mining?

The answers to these questions were already discussed in the first keynote lecture by EURELCO President Peter Tom Jones. The answers provided by the EC were indeed rather straightforward:

1. The EC has not made any calculations yet as regards the potential cleanup bill for its landfills.
2. There has been no concerted effort to map the resource potential of EU’s landfills.
3. There have been no specific calls for ELFM type of Horizon 2020 projects.

The answers demonstrate that Europe as a whole does not really have a vision yet with respect to the handling of its historic legacy of landfills. In the context of the on-going dis-

cussions to develop the Circular Economy Package I believe the time has come to truly integrate a more comprehensive vision with respect to EU’s landfills.

From EURELCO’s bottom inventory exercise, which was presented in great detail today, we can draw several high level conclusions:

1. Firstly, data on landfills in the individual EU Member states are hard to come by. A concerted EU-wide inventory exercise is very timely;
2. Secondly, from the data we do have, the conclusions are quite clear:

- The figure for the total amount of landfills in Europe is most likely even bigger than initially thought. With a reasonable safety level we can now state that Europe hosts more than 500,000 landfills.
- 90% of those landfills, that is more than 450,000, are in reality non-sanitary landfills, predating the Landfill Directive (which only came into force in 1999). In most cases non-sanitary landfills lack the required environmental protection technologies and will eventually require costly remediation.
- To put it more bluntly, the Landfill Directive is therefore rather irrelevant for at least 450,000 landfills, corroborating that a specific ELFM vision for Europe is needed, independent of the current Landfill Directive, which of course remains highly valuable for safely operating Europe’s still operational landfills.
- The EURELCO infographic has also shown that around 80% of Europe’s landfills essentially contain Urban Solid Waste, while only 20% are landfills containing more specific industrial wastes and residues. The most important difference between these type of landfills is that the former are typically publically owned, while the latter are privately owned and in many cases may contain significant levels of





Hilde Vautmans
Member of the European Parliament

critical metals for the European Union. It is clear that distinct policies will be needed.

- I believe the industrial landfills will be mined by the companies who own them if and when they have demonstrated there is a positive business case for their mining, and assuming the technology is ready for dealing with these low-grade wastes and residues. In fact, the recently published new Horizon 2020 calls already address these challenges. So I'm not too worried about the fate of these type of landfills.

However, for the Urban Solid Waste landfills the case is different. As they are publicly owned and in most cases pose a medium to long term environmental and health risk, I believe Europe needs to develop a specific programme. As addressed by several speakers today, including Eddy Wille of the Flemish Public Waste Agency, a combined resource-recovery and remediation strategy for these landfills could offer a way forward. This approach will drastically reduce future remediation costs, regain valuable land surface, while at the same time making available billions of tonnes of valuable resources contained within these landfills.

For ELFM to prosper, the European Commission, in alliance with the national and regional Public Waste Agencies, needs to create the legal frameworks, in close collaboration with all stakeholders. ELFM can trigger technological innovation in a circular economy framework. As we also know from several McKinsey reports on the circular economy, the potential for local job creation, including both high and low skilled jobs, is also clear for ELFM. And today we've heard that private businesses are ready to take part in this broadened circular economy model.

Furthermore I've seen several initiatives from industry, who

have invested heavily in R&D, in order to develop to a sustainable ELFM business based on circular economy driven business models. At this moment they have outgrown the R&D maturity level and the next appropriate/logical step are industrial scale demonstration projects to upscale the innovative upcycling technologies in order to confirm the socio-economical potential of these integrated solutions to the grand societal challenges Europe and the rest of the world is facing. This next step is often considered to valley of death, therefore the Commission and Parliament should explore and offer the right instruments to support these industrial initiatives.

Finally, I also confirm that it's mandatory to adopt the quadruple helix model approach in order to come to a sustainable implementation from all points of view, supported by the different actors involved. For this novel concept I can tell from the participants list that this approach has also been put into practise, therefore highlighting the importance of associations as EURELCO.

As a MEP I promise I will continue to work to make this ELFM programme happen, as I truly believe this wonderful concept offers us a win-win perspective in term of economics, innovation levels, job creation and doing our bit for the environment. I invite all of you to join me in this long-term project.

I thank all speakers and participants for making this first ELFM Seminar happen. Let's hope more will follow.





VICTOR DRIES
Moderator

“It was very interesting to see that so many people from different countries and with different backgrounds, as well as European experts from four different DG’s came together, combining research, energy, resources, environment and industry. Bringing all this knowledge and expertise together shows that Enhanced Landfill Mining may be an option to deliver us with resources and find a solution for the old landfills in Europe.”



EDDY WILLE
Flemish Public Waste Agency

“The important thing about this seminar is that we are with quite a lot of people who are interested in how to deal with our landfills in the future. We can’t wait to start with the landfill management and the mining project. So it is very important that we start today and that we see that there is a common ground to go further on this issue. It is not a question that we are not mining them at a large scale at this moment. We have to start with the planning.”

