CLEAR
IWWG Working Group on
Landfill Gas Emissions to the Atmosphere
Chair: Marion Huber-Humer / Peter Lechner

CLEAR (Consortium for **L**andfill **E**missions **A**batement **R**esearch**)** is an international working group to coordinate interdisciplinary research on the quantification and mitigation of landfill gas emissions to the atmosphere.

The CLEAR Working Group emerged from a recognized need among participants at a recent IWWG-workshop, which was held in the context of a conference (the Second Intercontinental Landfill Symposium, Asheville, North Carolina, October 2002) for a mechanism to coordinate international research on landfill gas emissions.

The CLEAR Working Group members include academic and industrial researchers and scientists from Europe, the United States and Canada. Member expertise encompasses a broad range of disciplines, including microbiology, soil science, chemistry, geochemistry, civil and environmental engineering, and waste management. Collectively, the CLEAR members have many years of experience with the measurement and modeling of landfill gases at local, regional, and global scales.

Currently, the following institutions/people take part to the group:

- CREED –Landfill R&D Dept - Véolia Environnement, France: *C. Aran*
- Department of Civil Engineering, North Carolina State University, US: *M. Barlaz*
- Institute WAR, Chair of Waste Management, Darmstadt University of Technology, Germany: *J. Berger*
- Landfills +, Inc. & Dept. Of Earth and Environmental Sciences, University of Illinois, Chicago, US: *J. Bogner*
- Dept. Of Water and Environmental Studies, Linkoeping University, Sweden: *G. Borjesson*
- Department of Oceanography, Florida State University, US : *J. Chanton*
- Department of Chemical & Petroleum Engineering, University of Calgary, CA: *De Visscher*
- CalRecovery, Inc., US : *L. F. Diaz*
- Department of Biological and Environmental Science, University of Jyväskylä, Finland: *J. Einola*
- Kuopio University, and Matti Ettala Oy, Finland: *M. Ettala*
- Waste Management Department AGR mbH / University of Essen, Germany: *Ch. Felske*
- Institute of Soil Science, University of Hamburg, Germany: *J. Gebert*
- Faculty of Engineering, University of Calgary, CA: *P. Hettiaratchi*
- Department of Civil Engineering , UNC-Charlotte, US: *Hilger*
- Institute of Waste Management, BOKU-University of Natural Resources and Applied Life Sciences Vienna, Austria: *P. Lechner, M. H.-Humer*
- Environment & Resources DTU , Technical University of Denmark., Denmark: *P. Kjeldsen, G.B. Pedersen, Ch. Scheutz*
- Div. of Landfill Science and Technology, Luleå University of Technology, Sweden: *Ch. Maurice*
- Department of Applied Analytical and Physical Chemistry, Ghent University, Belgium: *K. Mahieu*
- Department of Radio and Space Science, Chalmers University of Technology, Sweden: *Samuelsson*
- Afvalzorg Deponie BV (NV Afvalzorg's landfill division), Netherlands: *H. Scharff*
- Soil, Water and Climate Department, University of Minnesota, US: *Spokas*
- Institute of Environmental Protection Engineering, Lublin University of Technology, Poland: *W. Stepniewski*
- Department of Waste Management, Hamburg University of Technology, Germany: *Streese*

- Department of Civil and Environmental EngineeringUniversity of Melbourne, Australia: *S.T. S. Yuen*

An initial focus of CLEAR is the utilization of natural biological processes to reduce emissions of methane and non-methane organic compounds (NMOCs). A second focus is on improved methodologies to measure and model landfill gas emissions.

Aims and Scope

The working group provides a forum for members to **discuss and exchange ideas, generate hypotheses, and to jointly consider and relate results and findings** from diverse projects. By fostering international and interdisciplinary communication and pooling data, research advances will be accelerated, and future research needs will be identified and synthesized more effectively. From the synergy fostered by CLEAR, more innovative and comprehensive approaches and strategies to measure, characterize, and mitigate landfill gas emissions will emerge.

As research efforts are coordinated and new results are generated, the group can begin to serve as a clearinghouse and point of contact for those seeking information about measuring, modeling, and mitigating landfill gas emissions. Landfill operators, legislators, industry groups, and citizen groups will be able to access information through contact with CLEAR. Furthermore, collaborations from within the group will be published in international journals, so that ready access to information will be available to the research community. Some of the research topics that are being addressed by CLEAR members include:

- landfill gas generation and emissions
- control and mitigation strategies for LFG-emissions
- prediction and modeling on a regional, national and global basis
- contribution of landfill methane to the greenhouse effect and climate change
- microbial methane oxidation
- biodegradation of NMOCs in landfill cover soils

The current objectives of CLEAR include:

- Standardization of methods used to measure biotic methane oxidation capacity
- Fine-tuning isotope methods to measure methane oxidation
- Quantification and field validation of LFG-emissions and effects of diverse mitigation technologies
- Development and improvement of engineering systems to enhance methane oxidation in landfill cover soils
- Modeling of methane oxidation in landfill cover materials
- Biodegradation of NMOCs in landfill settings, including both aerobic cover soils and deeper anaerobic zones

CLEAR plans to encourage and implement frequent scientific exchange through an email discussion group platform. An annual workshop will be convened to maintain personal contact among members, introduce new members to the group, and to provide a forum for presentations and interactive group discussions.

More information about CLEAR can be found on the CLEAR website (currently under construction)**:** http://ch4ox.lmem.us

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