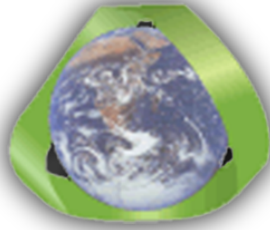


WTERT



Waste-to-Energy Research & Technology Council

Advancing Sustainable Waste Management

PROGRAM

**WTERT 2010 Bi-Annual Meeting at Columbia University
NEW YORK CITY, OCTOBER 7 & 8, 2010**

Location:

**Davis Auditorium, Schapiro Center for Engineering and Physical Science Research
Fu Foundation School of Engineering and Applied Science**

520 West 120th St. (between Broadway and Amsterdam Avenue), New York City



THURSDAY AM, OCTOBER 7, 2010

8:30 AM **Registration and continental breakfast was held in the lobby of Davis Auditorium**
(please see map, page 15; photo, page 16)

The sponsorship of the breakfast by HDR Engineering (www.hdrinc.com)
is gratefully acknowledged

9:00 AM **Welcome to WTER 2010 Meeting:**

Prof. Klaus Lackner, *Chair of the Dept. of Earth and Environmental Engineering*
and Director of the Lenfest Center for Sustainable Energy of Columbia University

"ADVANCES IN GLOBAL WTE TECHNOLOGY"

SESSION CHAIR: MR. TED MICHAELS, PRESIDENT, ENERGY RECOVERY COUNCIL, U.S.A.

9:10 AM **Contributions of the Earth Engineering Center to understanding the impacts of waste management on climate change: 2008-2010:**

Prof. Nickolas J. Themelis, *Stanley-Thompson Prof. Emeritus, Columbia University*
(njt1@columbia.edu)

The Earth Engineering Center (EEC) was formed in 1995 with the mission to direct academic research to processes and products that balance the increasing use of materials with the finite resources of the Earth and protection of the environment. EEC contributed to the formation of the Department of Earth and Environmental Engineering at Columbia and concentrated on advancing sustainable waste management in the U.S. and abroad. This led to the 2002 formation of WTER, in collaboration with the Energy Recovery Council (ERC). Since 2008, there have been sister organizations to WTER in Canada, China, Germany, Greece (SYNERGIA) and, this year, in Japan and Brazil; others are being formed in France and the U.K. EEC research has shed light on the benefits, limitations, and synergies of recycling, composting, WTE and modern landfilling. In 2009, EEC and ERC helped bring about a mutual understanding as to the respective GHG effects of WTE and modern landfilling. The results of EEC research are exemplified in the graphs of the Expanded Hierarchy of Waste Management and the Ladder of Sustainable Waste Management. More recent EEC projects are the carbon benefits of Single Stream collection and processing of recyclables, the potential for oil production from source-separated plastic wastes, and the performance of WTE facilities in China and France with regard to controlling dioxin emissions.



Prof. Themelis is a chemical and metallurgical engineer who, since 1995, has focused on the best means for managing solid wastes. He is elected Member of the National Academy of Engineering, first Chair of the Department of Earth and Environmental Engineering of Columbia (Henry Krumb School of Mines), Director of the Earth Engineering Center, and Chair of WTER-U.S.

9:30 AM **Towards Sustainable Solid Waste Management System in Singapore:**

Mr. Lim Siak Heng, *National Environmental Agency, Singapore*
(lim_siak_heng@nea.gov.sg)

Singapore adopts a multi-pronged strategy and is invested in a comprehensive and efficient solid waste management system to minimize and manage waste in a sustainable manner. The core

strengths of the system are its low environmental footprint, low landfill space requirements and a cost-efficient integration of the entire municipal chain of waste management activities in a densely populated and highly urbanized setting. This system encompasses collection, sorting of recyclables, thermal treatment, and disposal. Today, Singapore recycles about 57% of its solid waste while 41% is incinerated and the remaining 2% is disposed of at the Semakau Landfill.



Lim Siak Heng graduated from the National University of Singapore with a B.S. in Mechanical Engineering and an M.S. in Safety, Health & Environmental Technology. He has worked with the National Environment Agency since 1994. His career spans across various departments and functions covering policy and planning, pollution control, and waste management. He is currently involved in the promotion and administration of grant programs to support waste management research and technology development.

9:50 AM

Monitoring of dioxins and other POPs in a grate furnace WTE combusting household waste; and in a fluidized bed WTE co-combusting RDF/ASR and sludge:

Prof. Carlo Vandecasteele, *Department Chemical Engineering, University of Leuven, Belgium* (carlo.vandecasteele@cit.kuleuven.be)

PCDD/Fs and other Persistent Organic Pollutant (POP) were monitored at a grate furnace WTE combusting household waste and in a fluidized bed co-combusting RDF, Automobile Shredder Residue (ASR) and sludge cake in an industrial fluidized bed WTE. Not only flue gases, but also bottom ash, fly ash and boiler ash, and flue gas cleaning residue were analyzed for POP. The individual POP and a weighed sum of the POP in input and output were compared, in order to determine if the incinerators are a source or a sink of POPs. For the fluidized bed incinerating wastewater sludge and RDF, the total weighed POP output in all output fractions is comparable to the POP input, but the POP output in the flue gas is much lower than the POP input. When RDF, ASR and sludge cake are co-combusted in an industrial fluidized bed WTE, the total POP output in all output fractions is much less than the POP input. From the PCDD/F fingerprint information can be deduced on the formation mechanism.



Carlo Vandecasteele is professor at the Department of Chemical Engineering of the University of Leuven. He has special research and teaching interests in waste management, treatment and recycling; environmental impact assessment of industrial production processes, sites and regions; industry and sustainability. He authored and coauthored several books, and many international peer-reviewed papers.

10:10 AM

How WTE is contributing to solve the waste management crisis in Naples, Italy:

Dr. Antonio Bonomo, *A2A s.p.a., Brescia, Italy* (antonio.bonomo@a2a.eu)

For several years, it was known that Naples was running out of landfilling space but plans for implementing state-of-the art WTE facilities were deferred time and again for various reasons till a true “garbage crisis” emerged that paralyzed the city and made world headlines. The solution of this major environmental problem in Naples will be described.



Dr. Bonomo is a graduate of the Polytechnical University in Milano and Chair of the Technical and Scientific Committee of Federambiente, the Italian federation of waste management companies. He is Director of the Energy Generation division of A2A s.p.a., the multi-utility company resulting from the 2008 merger of the municipal utilities of Brescia (ASM s.p.a.; winner of the WTERT 2006 Best WTE award), and Milano (AEM s.p.a.). Dr. Bonomo is Managing Director of Aprica s.p.a. and was heavily involved in the implementation of WTE in Naples. He is the author of over 200 presentations at energy and environment conferences.

10:30 AM

Coffee Break

10:50 AM

Increasing WTE thermal efficiency - Sharing energy with industry (Manchester, U.K. and Amotfors, Sweden):

Dr. Johan De Greef, *Technology Manager, Keppels Segher, Belgium*
(johan_de_greef@keppelsegghers.com)

The feasibility of waste-fired Combined Heat & Power (CHP) plants will be illustrated by two cases in which industrial companies took the opportunity to replace fossil fuels by household (or similar) waste as energy source for their industrial production. The Thermal Power Station (TPS) in Runcorn (UK) is being developed as part of the Greater Manchester Waste contract. After completion in 2012, the TPS (2 x 87 MW_{th}) will be processing up to 425,000 tons of high-calorific RDF. The TPS (WTE) is an example of how an economy of scale allows for a highly efficient supply of process steam and electricity to INEOS at one of the largest industrial sites in the UK.

The Nordic Paper WTE in Åmotfors (Sweden) combusts about 74,000 tons of medium-calorific municipal solid wastes (MSW) per year and is an example of how CHP can also be realized at a smaller scale (1 x 28 MW_{th}). With a dedicated design that exploits plant *flexibility*, the neighboring energy consumers (paper mills, district heating and electrical grid) can be adequately served.



Dr. Johan De Greef holds a PhD in Chemical Engineering (2005) and a M.Sc. in Biotechnical & Chemical Engineering (2000) with environmental specialty, from the Free University of Brussels. In 2005, he joined Keppel Seghers as thermal Proposal Engineer, in charge of technical files and price calculations. As Proposal Manager dedicated to the *Greater Manchester Waste* project in 2007, he participated in securing the EPC-contract for the WTE-scope in April 2009. He was appointed to Technology Manager in July 2009. Dr. De Greef is author of several publications.

11:10 AM

A New CFB incineration technology for power generation:

Prof. Mingjiang Ni, *Institute for Sustainable Energy, Zhejiang University, Hangzhou, China* (mjn@zju.edu.cn)

In view of China's economic development level and the fact that the MSW is mixed and of relatively high moisture, a unique circulating fluidized bed (CFB) incineration technology for power generation, that can incinerate MSW of poor quality, was developed by Zhejiang University. Emission control of pollutants including toxic POPs and heavy metals have been studied and advanced. The developed new technologies have shown very prominent advantages and become a leading technology in China's MSW WTE power generation market.



Dr. Mingjiang Ni is Professor and Director of Institute for Sustainable Energy at Zhejiang University in Hangzhou, China. He is also the Vice President of Chinese Society of Power Engineering. He was the Provost of Zhejiang University before 2010. His research interests include Renewable Energy (Biomass, Solar Energy), Industrial and Municipal Waste Incineration, and Coal Utilization. (Zhejiang University has one of several laboratories certified for dioxin/furan analysis in China)

11:30 AM

Life Cycle Analysis (LCA) of Various WtE Flue Gas Treatment Technologies:

Ms. Bettina Kamuk, *Project Director, Waste-to-Energy Sector, Ramboll Engineering, Copenhagen, Denmark* (bkc@ramboll.dk)

The choice of the Air Pollution Control (APC) equipment is always a difficult decision in planning for a new WTE. Several elements are influencing the decision, such as available technologies, capital and operating costs, and regulatory requirements. Recently, Ramboll carried out a thorough LCA of various APC scenarios for a Danish waste management authority. The LCA combined with a technical and a financial evaluation paved the way for the waste authority's selection of the preferred APC technology. The APC scenarios included dry, semi-dry and wet technologies and de-NOx

solutions based on SNCR and SCR technologies. The LCA was based on EASE-WASTE and considers consumption data, residual products, emissions and consequences on the overall plant energy efficiency, including heat recovery from flue gas condensation.



Ms. Kamuk obtained her engineering degree from Denmark Tekniske Universitet. She is Market Director for waste-to-energy at the consulting engineering company Ramboll Denmark, a leader in WTE technology with over thirty ongoing WTE projects worldwide. Ms. Kamuk is an active member of ISWA and CEWEP and her more recent projects include Denmark, Norway, USA and Canada.

11:50 AM

Trends in utilizing WTE bottom ash in Europe:

Dr. Juergen Vehlow, *Institute for Technical Chemistry - Division of Thermal Waste Treatment, Germany* (juergen.vehlow@kit.edu)

While waste incineration is practiced in most of the industrialized European countries following nearly the same technical and environmental standards, this is not the case concerning the beneficial use of the incineration residues. Several EU countries, e.g. Denmark, Germany, and The Netherlands utilize almost all bottom ashes as secondary construction material, mainly in road building, following general national regulations. Other countries like Sweden utilize some bottom ash in specific cases; and others, like Switzerland, that classifies bottom ash as reactive material, landfill their bottom ash. This presentation will give examples and new data on the handling in various countries and will explain, in brief terms, the prevailing environmental standards and test procedures. With regard to Air Pollution Control (APC) residues such as fly ash, nearly all re classified and disposed as hazardous materials.



Dr. Juergen Vehlow retired in 2006 after working for more than 20 years at Forschungszentrum Karlsruhe, Germany, now renamed Karlsruhe Institute of Technology (KIT), on chemical processes in waste incineration with a special focus on residue treatment and fate of elements and organic pollutants. His main interest is the worldwide development of waste management strategies, especially in view of energy recovery from biogenic waste. Dr. Vehlow is member of the Advisory Board of WTER.

12.30 AM

Lunch was served in the Presidents Room (3rd Floor) of the Faculty House
(please see map, page 15; photo, page 16)

The sponsorship of the luncheon by Wheelabrator Technologies
(www.wheelabratortechnologies.com) is gratefully acknowledged

THURSDAY PM, OCTOBER 7, 2010

"WTE RESEARCH AT COLUMBIA AND OTHER UNIVERSITIES"

**SESSION CHAIR: PROF. MARCO CASTALDI, EARTH & ENVIRONMENTAL ENGINEERING,
COLUMBIA UNIVERSITY, U.S.A.**

2:00 PM

Effects of Organics Diversion on Landfill Gas Generation and Comparison of Landfills and WTE:

Prof. Morton Barlaz, *SUR, North Carolina State University, U.S.A.*
(barlaz@unity.ncsu.edu)

The objectives of this presentation are to explore the effects of organics diversion of the methane generation potential of landfills and to evaluate the environmental performance of Landfills and Waste-to-Energy Facilities by Using Life-Cycle Analysis. The diversion of food waste and yard waste can significantly reduce the methane potential of waste in landfills. All life-cycle studies that could be identified show that waste to energy is superior to landfill disposal.



Dr. Morton A. Barlaz is Professor and Head of the Department of Civil, Construction, and Environmental Engineering at North Carolina State University. He received a B.S. in Chemical Engineering from the University of Michigan and an M.S. and Ph.D. in Civil and Environmental Engineering from the University of Wisconsin. Dr. Barlaz is the author of over 80 peer-reviewed publications and has made over 200 presentations at conferences throughout the world. In 1992 he was awarded a Presidential Faculty Fellowship from the National Science Foundation.

2:20 PM

Energy and Materials from Waste and Biomass: The role of WTERT France:
(www.wtert.fr)

Prof. Ange Nzihou, *Ecole des Mines d'Albi-Carmaux, France*
(ange.nzihou@mines-albi.fr)

The amounts of MSW and residual biomass generated keep increasing in western countries such as France. Incineration is used widely in France (128 plants) to reduce the need for landfilling and also recover energy in the form of electricity and heat (WTE). However, the public opinion is generally against incineration despite its tangible benefits because of fears about the level of emissions, such as dioxins and heavy metals. In fact, this study showed that the great majority of the WTEs in France comply with the EU regulation and French standards. The public perception of WTE being a threat to citizen's health is not warranted but is understandable because of lack of adequate information to the public with regard to WTE emissions in the various regions of the country. Also, the advantages of WTE in terms of energy production and land conservation are not underlined enough. This presentation presents the results of a study of emissions by individual WTE plants in France and the role that WTERT-France can play in providing credible and needed information to policymakers and the general public.



Ange Nzihou is Professor of Chemical and Environmental Engineering at the Ecole des Mines d'Albi in France. His research interest is on thermal treatments, characterization, engineering properties of waste and biomass for valorization. He is visiting Professor in number of universities overseas (USA, China, Brazil), and expert for various international companies and institutions. Professor Nzihou is Editor-in-Chief of "Waste and Biomass Valorization" Journal (published by Springer) and Founding Chair of the WasteEng Conference Series on the valorization of waste and biomass to energy and useful materials.

2:40 PM

Trends in recycling and means for increasing plastics recycling:

Mr. Jawad Bhatti and Prof. Nickolas J. Themelis, *Earth Engineering Center, Columbia University* (jabhatti@gmail.com) (njt1@columbia.edu)

Plastics constitute a significant and increasing share of industrial material production. As their consumption increases, so does their quantities in the municipal solid wastes stream. Although theoretically recyclable, the bulk of plastic wastes are landfilled, which is clearly a loss of non-renewable, fossil-based resources. Exact quantities of plastic wastes and recovery rates are covered, particularly for the NYC waste stream. Emerging technologies and trends for recovery are discussed.



Jawad A. Bhatti graduated from Union College in 2005 with a B.S. in Electrical Engineering. He went on to work as a Control Systems Engineer working on power-generation turbines. He is a recent graduate of Columbia University's Earth and Environmental Engineering with a master's thesis entitled *The Current State and Potential for Increasing Plastics Recycling in the U.S.*

3:00 PM

Utilization of BFR plastics in recovery of valuable metals during thermal treatment with solid wastes:

Dr. Sylwia Oleszek-Kudlak, Dr. Mariusz Grabda, Dr. Etsuro Shibata, Dr. Takashi Nakamura, *Nakamura Group, Tohoku University, Japan* (mariusz@franken.tagen.tohoku.ac.jp)

Among technologies utilized for thermal treatment of waste plastics containing brominated flame retardants (BFR) (incineration, gasification, pyrolysis) special attention should be paid on potential advantages of co-combustion of the plastics with metal-rich metallurgical dusts. During thermal degradation of the BFR waste plastics, the evolved bromine (in form of HBr) can be utilized for bromination of the metals. The formed metal bromides can be vaporized from solid residue and be concentrated in fly ashes, from where can be recovered. Thus the co-combustion of the mixed wastes can be chance for simultaneous recovery of both energy and inorganic fractions. Concept of the process for thermal treatment of BFR-waste plastics with solid wastes containing metallic oxides will be proposed. Initial experimental results concerning behavior of ZnO during thermal treatment with tetrabromobisphenol A (TBBPA), and factors affecting the bromination-evaporation process will be discussed.



Dr. Eng. Mariusz Grabda is an Assistant Professor at Institute of Environmental Engineering of Polish Academy of Sciences, and currently a post-doc fellow in the Institute of Multidisciplinary Research for Advanced Materials of Tohoku University in Japan. His primary research concerned on utilization of geothermal heat and natural utilization of sewage sludge. In recent years, his research area is dedicated to solid waste management, especially a thermal recycling of waste plastics containing brominated flame retardants.

3:20 PM

Coffee Break

3:40 PM

Sustainable Energy Conversion of Solid Wastes with Integrated In-Situ Carbon Sequestration:

Prof. Ah-Hyung (Alissa) Park, *Earth and Environmental Engineering, Columbia University* (ap2622@columbia.edu)

A large percentage of the United States energy demands are currently met using liquid fuel imported from politically unstable parts of the world. Such imports pose a potential threat to our national security and, therefore, finding an alternative source to supply our country's ever growing energy demand is critical. One of the less investigated domestic sources of alternative energy is non-

recyclable plastics. Although we are recycling a large quantity of plastic bottles (~34%), the actual fraction of all plastics being recovered and recycled is less than 6%. Thus, we have been developing an energy conversion system that converts the now landfilled petrochemical portion of municipal solid wastes (MSW) to value added liquid fuel as a very attractive alternative in terms of environmental sustainability and national security. One of the key innovations of this waste-to-liquid fuel technology is the integrated carbon capture and storage system based on chemical looping technology and in-situ carbon mineralization.



In fall 2007, Ah-Hyung (Alissa) Park joined the Department of Earth and Environmental Engineering at Columbia University as the Lenfest Junior Professor in Applied Climate Science and as the Associate Director of the Lenfest Center for Sustainable Energy, after completing her Ph.D. at The Ohio State University. Her research interests include carbon capture and storage, sustainable energy conversion systems, particle technology and multiphase flows. Park received a number of professional awards and honors including the NSF CAREER Award in 2009.

4:00 PM

[Results of the BioCycle/Columbia 2010 survey of waste generation and disposal in the U.S.:](#)

Mr. Rob van Haaren, *Earth and Environmental Engineering, Columbia University*
(rv2216@columbia.edu)

Every two years, the Earth Engineering Center conducts a survey in collaboration with BioCycle on Waste Management of MSW in the United States. Each State is asked to submit data about the tons of MSW are recycled, composted, combusted and landfilled. As in a simple mass-balance, the total amount of MSW generated in the U.S. was calculated by adding up all the disposal tonnages while accounting for imported and exported waste. This year's survey requested 2008 data (to allow sufficient data gathering by the states). The total amount of MSW generated was estimated to be 389 million tons, which corresponds to 1.28 million U.S. tons (1.16 metric tons) per capita. Of this, 18% was recycled, 6% was composted, 7% was combusted in WTE power plants, and 69% was landfilled. This presentation will describe the methodology used in this survey and the results obtained on various aspects of waste management in the U.S. in 2008.



Rob van Haaren obtained his BS at the University of Technology in Eindhoven, Netherlands and his M.S. in Earth Resources Engineering from Columbia University. His thesis subject was the Life-Cycle Analysis of different aerobic composting methods. During this time, he worked on the BioCycle/Columbia "State of Garbage in America". Mr. Van Haaren is now a doctoral student in Earth and Environmental Engineering of Columbia working at the Center for Life-Cycle Analysis on "Energy storage for the future electricity grid".

4:20 PM

[Ultrafine particle emissions from waste transportation averted as a result of WTE: A case study of the New York metropolitan area:](#)

V. Faye McNeill and Joseph Barakat, *Earth Engineering Center, Columbia University* (vfm2103@columbia.edu; jmb@bkats.com)

Combustion processes are the dominant anthropogenic source of particulate matter emissions to the atmosphere. Recently, special attention has been directed to the potential health effects of ultrafine particles (UFP, also known as nanoparticles) of diameters less than 0.1 μ m. Building on our previous study of UFP emissions from waste-to-energy (WTE) (Yinon 2010), we performed a case study of UFP formation and emissions from mobile sources associated with waste transportation in the New York metropolitan area. Our focus is on quantifying the UFP emissions potentially averted by the use of WTE for disposal (vs. landfilling). Our approach was modeled on that of DeAngelo (2004): Hypothetical emissions associated with WTE were calculated using emission factors from Morawska et al. (2008) and assuming that all municipal solid waste (MSW) from each of New York's five boroughs could be accepted by the nearest of seven existing local WTE facilities (Essex County RRF,

Union County RRF, Babylon RRF, Hempstead RRF, Huntington RRF, MacArthur WTE Facility, and Wheelabrator Westchester). Emissions from mobile sources associated with landfilling were similarly calculated assuming that all MSW was transported from the population center of each borough to the nearest local transfer station via 12-ton collection vehicles, then transported to the Keystone Sanitary Landfill in Dunmore, PA using 20-ton transfer trailers. We calculate that UFP emissions due to waste transportation in this idealized WTE scenario are less than half those emitted in the landfilling scenario.



Dr. McNeill (M.S., PhD, MIT) is Assistant Professor of Chemical Engineering at Columbia University. Her research interests include atmospheric aerosol chemistry, aerosol science, and atmospheric chemistry of environmental interfaces.

The presentation was made by Mr. Joseph Barakat, Research Assistant of Prof. McNeill.

4:40 PM

WTERT research on resource recovery from wastes by gasification:

Prof. Marco Castaldi, *Earth and Environmental Engineering, Columbia University*
(mc2352@columbia.edu)

Progress made on gasification research by WTERT in 2008-2010 will be summarized and the results of a critical analysis of plasma-assisted gasification processes, as applied to solid wastes, will be presented. In addition, progress in the areas of landfill gas utilization related to emissions reduction, modeling of WTE combustion processes and possible beneficial uses of ash will be discussed.



Prof. Castaldi is a graduate in chemical engineering of Manhattan College (B.S., M.S.) and UCLA (Ph.D.). After nearly ten years of industrial research on combustion and catalysis, he joined Columbia in 2004. He is a member of the executive committee of ASME's MER division, Chair of the Graduate Studies Committee of the Earth and Environmental Engineering Department and Associate Director of the Earth Engineering Center.

5:30 PM

Poster Session and Reception was held in the lobby of The Italian Academy
"Casa Italiana" (please see map, page 15; photo, page 16)

Researchers will be present to discuss the work presented in the posters. This session will be followed by reception and cocktail hour.

The sponsorship of the Reception by the Beta Analytic Inc. of Miami Florida
(www.betalabservices.com) is gratefully acknowledged

6:45 PM

WTERT 2010 Awards Dinner was held in the main hall of The Italian Academy
"Casa Italiana" (please see map, page 15; photo, page 16; Reservation Required)

The sponsorship of the WTERT Awards Dinner by the Materials and Energy Recovery (MER)
Division of ASME International (www.divisions.asme.org/MER)
is gratefully acknowledged

FRIDAY AM, OCTOBER 8, 2010
OPEN TO THE PUBLIC

8:30 AM **Continental breakfast was held in the lobby of Davis Auditorium**
(please see map, page 15; photo, page 16)

The sponsorship of the breakfast by Malcolm Pirnie (www.pirnie.com)
is gratefully acknowledged

"POLICIES FOR SUSTAINABLE WASTE MANAGEMENT, REPORTS BY AWARD WINNERS"
SESSION CHAIR: PROF. NICKOLAS THEMELIS, EARTH ENGINEERING CENTER,
COLUMBIA UNIVERSITY, U.S.A.

9:00 AM **Developments on WtE across Europe:**

Mr. Jan Manders, *Deputy President, Confederation of European Waste to Energy Plants (CEWEP), Brussels, Belgium* (jan.manders@efwc.nl)

The major aspects of development in the WtE business across the EU will be discussed: The recognition of WtE plants as Recovery (R1) provided certain energy efficiency criteria are met; the capacity development across Europe; the contribution being made by the WtE industry in Europe on climate related aspects, i.e.: GHG mitigation and the contribution to the national binding targets on Renewable Energy.



Mr. Jan Manders has a Chemical Engineering education from the Eindhoven University of Technology and started his professional career in 1972. He joined Unilever where he held various international management positions, working in both the detergents and the speciality chemicals business of Unilever. Mr. Manders joined AVR in 2000 as the Director responsible for AVR's Waste Processing Business and worked in this role until 2007, he was the Director External Affairs of AVR until July 2008. Mr. Manders is now the Deputy President of CEWEP.

9:20 AM **ISWA's White Paper on Waste Management and Climate Change:**

Mr. Antonis Mavropoulos, *International Solid Waste Association (ISWA), Vienna, Austria* (amavrop@epem.gr)

The International Solid Waste Association (ISWA) submitted its Waste and Climate Change White Paper at the 15th United Nations Climate Change Conference in Copenhagen, setting forth technologies and mechanisms that can transform the waste sector into a net global reducer of GHG emissions. ISWA's objective is to facilitate global change of attitude regarding the importance of waste management in Climate Change abatement. The White Paper emphasized that investments in waste management infrastructure should be prioritized as very important in terms of delivering substantial and direct CO₂ emission reductions while also resolving serious environmental and health problems. Other global activities of ISWA will also be discussed.



Antonis Mavropoulos is a Chemical Engineer and holds a Management degree from IESE Business School. Since November 2008 he has been the ISWA Chair of Scientific - Technical Committee. He is also a Waste Management Expert at the European Economic and Social Council from June 2009. He has worked as waste management consultant in several countries of Europe and Africa since 1995. He has completed more than 150 projects in Greece, Egypt, Morocco, Turkey, Albania, etc. He is the author of several scientific and technical papers.

Because of serious illness in his family, Mr. Mavropoulos could not travel to the U.S. The ISWA presentation was made by Prof. Avraam (Makis) Karagiannidis of the Aristotle University of Thessaloniki and member of the management committee of WTERT-Greece.

9:40 AM

Sustainable Waste Management in Vienna: (WTER Award Winner)

Mr. Rainer Kronberger, City of Vienna, Austria
(rainer.kronberger@wien.gv.at)

Vienna recycles about 34% of municipal waste, 63 % is treated in waste-to-energy plants and only 3 % (demolition waste etc.) is landfilled. Vienna's three WTE plants provide district heat to 144,000 Viennese households and electricity to another 44,000. The primary objective for of Vienna's Waste Management Department is to operate all plants and equipment in an economically and ecologically sustainable way. Equal emphasis is placed on environmental, social and economic aspects in the City's long term waste management plan. Key strategic aims include keeping waste transportation to a minimum, communication and public education, and using the best available technologies for waste treatment .A strategic environmental assessment is carried out at least every five years to update the waste management plan. Numerous experts, NGOs and the public are involved in this process.



Mr. Rainer Kronberger is vice-head of the department for waste management of Department 48 (MA 48) of the City of Vienna. He is responsible for the treatment of all municipal waste in Vienna. Mr. Kronberger is also President of ISWA Austria. ISWA Austria is a national member of the International Solid Waste Association (ISWA).

10:00 AM

The Lee County Integrated Solid Waste Management System: (WTER Award Winner)

Lindsey J. Sampson P.E., Lee County, Florida, U.S.A.
(lsampson@leegov.com)

The Lee County Solid Waste Management System (the "System") was developed in 1994, well before sustainability became a popular. The goal was to minimize landfill requirements and environmental impacts of waste management. The cornerstone of the System was a state of the art WTE facility. Mandatory garbage collection and franchised garbage collection services were established for the entire County. The recycling program, implemented in the late 1990s, became a prominent part. Residents, businesses, cities and municipalities have made a commitment to a sustainable system. The County has recently improved the collection of recyclable materials by implementing Single Stream recycling. A composting system using horticultural waste and biosolids was established a year ago. Clean, renewable energy from waste produced in Lee County was increased to 60 MW with a plant expansion in 2007. This addition of a third combustion unit has allowed Lee County to be the first U.S. WTE facility to validate carbon emission reductions under the Voluntary Carbon Standard Program.



Lindsey Sampson is the Director of the Lee County Florida Solid Waste Division. He has held this position for thirteen years and has been employed by Lee County for 19 years. Mr. Sampson served as the County's project manager during the permitting and construction of the County's WTE facility (1991 - 1994). He has over 26 years experience in plant engineering and project management. Mr. Sampson has a BS degree in Civil and Environmental Engineering from the University of Cincinnati and is a Florida Registered Professional Engineer.

10:20 AM

Coffee Break

10:40 AM

Gasification and Liquefaction Alternatives to Incineration for MSW Recycling Developed and Commercialized in Japan: (www.wtert.jp)

Prof. Kunio Yoshikawa, *Tokyo Institute of Technology and leader of WTERT-Japan*
(yoshikawa.k.aa@m.titech.ac.jp)

The major technologies used in Japan for energy recovery from municipal solid waste (MSW) are mass burning incinerators combined with landfilling of ash. However, shortage of landfill space together with new regulations for ash vitrification and the Japanese Containers and Packaging Recycling Law have driven R&D and commercialization of relatively novel thermal treatment processes based on gasification and liquefaction of MSW. This presentation will discuss novel gasification and liquefaction processes that are already operating in Japan and are possible future alternatives to grate combustion for effective energy recovery from MSW.



Dr. Kunio Yoshikawa is a professor of Frontier Research Center, Tokyo Institute of Technology, Japan, from where he received his PhD in 1986. His research areas are energy conversion, thermal engineering, combustion, gasification, waste treatment technologies and atmospheric environmental engineering, and he wrote more than 200 papers. He was awarded the AIAA Best Paper Award in 1999, ASME James Harry Potter Gold Medal in 2001, JSME Environmental Technology Achievement Award in 2006 and the Fellow of JSME in 2008.

BRIEF REPORTS BY REPRESENTATIVES OF WTERT SISTER ORGANIZATIONS:

11:00 AM

WtERT-Germany: Introduction to WtERT Germany: History, Goals and Activities:
(www.wtert.eu)

Mr. Emmanuel Serna, *Aachen and Munich Universities, Germany*
(serna@atz.de)

Overview of Waste Management and WtE Potential in the EU-12 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Bulgaria, Romania)



Emmanuel Serna is starting his PhD at the Institute of Resource and Energy Technology of the TU München. He received a B.Sc. in Electronic Engineering from the Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) in Mexico and a M.Sc. in Sustainable Resource Management from the TU München in Germany. Under Prof. Martin Faulstich and Prof. Peter Quicker he developed the WtERT Germany website and is currently the webmaster and scientific researcher there.

11:10 AM

WTERT-Canada: The State of EFW (WTE) in Canada: An Overview of Policy Options and Political Challenges: (www.wtert.ca) (www.energyfromwaste.ca)

Mr. John Foden, *President, Canadian Energy-From-Waste Coalition (CEFWC), Canada*
(jpfoden@presterjohn.ca)

Highlights of the Canadian waste market, important industry developments, and emerging government initiatives impacting waste-to-energy technologies and discussion of relevant case studies. The proactive work of the Canadian Energy-From-Waste Coalition (CEFWC) will be discussed with particular focus on projects under development, including Metro Vancouver, British Columbia and York-Durham, Ontario. This will conclude with an analysis of public opinion polling and an outline of CEFWC objectives for the Canadian market over the next two years.



Mr. Foden is a communications executive and has published widely in many publications, ranging from trade magazines to daily newspapers. His analyses of global and North American developments have been presented to federal, state, provincial, and municipal agencies. With the support from the membership, he has led CEFWC from a concept about the converging potential of energy and waste into an organization widely recognized as the voice of an emerging industry. CEFWC is the sister organization of WTERT in Canada.

After the WTERT-Canada presentation, **Mr. Dennis Ranahan** of *Regional Utility Planning of Metro Vancouver* was asked to comment on [The new WTE planned for Metro Vancouver](#).

11:20 AM

WTERT-China: Progress Report 2009-2010 C-WTERT: (www.wtert.cn)

Dr. Kong Songtao, Prof. Xiao Dazhi, Chongqing Universities, China
(kst@tom.com)

What the current situation of MSW in China is and the work done by C-WTERT for these cases. What C-WTERT's current focus on resolving the WTE process engineering problems. Another C-WTERT focus is to actively apply for government-funded social issues, which support the government to develop MSW disposal policy on engineering and social sciences. In addition, introduces the C-WTERT's work on the website.



Professor Xiao Dazhi is executive director of Chongqing Institute of Nonferrous Metals. His research interests include the theory and new technology for special metal smelting and processing of plastic deformation.

The presentation was made by Ms. Mingxiang Shao, Deputy Director of International Cooperation.

11:30 AM

WTERT-Greece: Waste Management in Greece & Potential for Waste-To-Energy:
(www.wtert.gr)

Dr. Efstratios Kalogirou, SYNERGIA, Greece
(synergia@synergia.com.gr)

The WTERT Greece (Synergia) presentation is an overview regarding waste management and WTE situation in Greece. SYNERGIA collaborates with EEC of Columbia University, the National Technical University of Athens (N.T.U.A), the Aristotle University of Thessaloniki (A.U.TH.) and also CEWEP. Its scientific research focused on WTE subjects and expands its scope on advancing the goals of sustainable waste management and mainly WTE development in Greece. Recently, Synergia succeeded to achieve the Greek Legislation L. 3851/2010 for Renewable Energy Sources (R.E.S.), which declares that the 'biodegradable fraction of municipal solid waste' is considered biomass, thus R.E.S and has a significant price for electricity to the network via WTE (87.85€/MWh).



Dr. Efstratios Kalogirou is the President of WTERT Greece (Synergia) and also a Research Associate in Earth Engineering Center of Columbia University. Dr. Kalogirou has a Ph.D. at the National Technical University of Athens, Department of Chemical Engineering. He is an Expert of Greek Court Appraisals in Chemistry, Chemical Engineering, Environmental Engineering (Water, Wastewater and Solid Waste Treatment, Marine Lubricants and Oils).

11:40 AM

WTERT-Brazil: WTE status in Brazil. What is needed to make WTE plants feasible in Brazil: (www.wtert.com.br)

Dr. Sergio Guerreiro, University of Brazil, Brazil
(sergiog@rjnet.com.br)

The newly approved Solid Waste Law of Aug 2010 (after 20 years of discussion in Congress). Impact of high moisture in MSW on the feasibility of WTE plants in Brazil and China. Compares waste in Brazil, Europe and USA. The first comprehensive feasibility study made for the city of Belo Horizonte for an 800 TPD of waste plus 20 MWth of natural gas WTE plant generating 30 MWe net.



Dr. Guerreiro graduated in Mechanical Eng from Catholic University of Rio de Janeiro. He obtained his MSc and PhD degree from UCLA in Mechanical Eng. He also has an MS in Nuclear Eng. from MIT. Since 2004 he has worked on improving the efficiency of WTE and biomass plants. Dr. Guerreiro's objective is to improve economic feasibility of WTE in Brazil by efficiency improvements combining natural gas and MSW.

11:50 AM **WTERT-U.K.: Public perception and Reaction of WTER-U.K.:** (www.wtert.org.uk)

Dr. Chris Cheeseman, Imperial College, U.K.
(c.cheeseman@imperial.ac.uk)

The current status of Waste to Energy technologies in the U.K.; drivers for change; barriers to further development; and the projected key role of WTER-U.K.



Dr. Cheeseman has a PhD from Oxford University (high temperature properties of ceramics) and BSc in Physics and Materials Science from the University of Warwick. Chris has industrial experience with Redland Technology, Morgan Materials Technology and Morgan Matroc. He has been associated with the Department of Civil and Environmental Eng. at Imperial College London since 1990. He is now the leader of a major research group working on the beneficial reuse of waste materials and resource efficiency within the Environmental and Water Resource Engineering (EWRE) Section of Imperial College.

12:00 AM **Questions from audience to panel of WTER representatives and general discussion**

1:00 PM **Conclusion of WTER 2010 Meeting**

Please note the following special event preceded the WTER meeting, sponsored by SWPD/ASME and Covanta Energy:

Visit of the Babylon, NY WTE plant of Covanta Energy.

Registrants to WTER meeting are invited to join. **Space is limited**, so please specify your attendance upon registration on the web only if you are sure of participating. WTER will confirm your reservation by e-mail. Bus will leave at 9.30 AM from in front of Mudd Hall (500 West 120th Street between Amsterdam and Broadway Avenues) and return to the same location in mid-afternoon. Casual attire is recommended and shorts and open-toed shoes should not be worn.

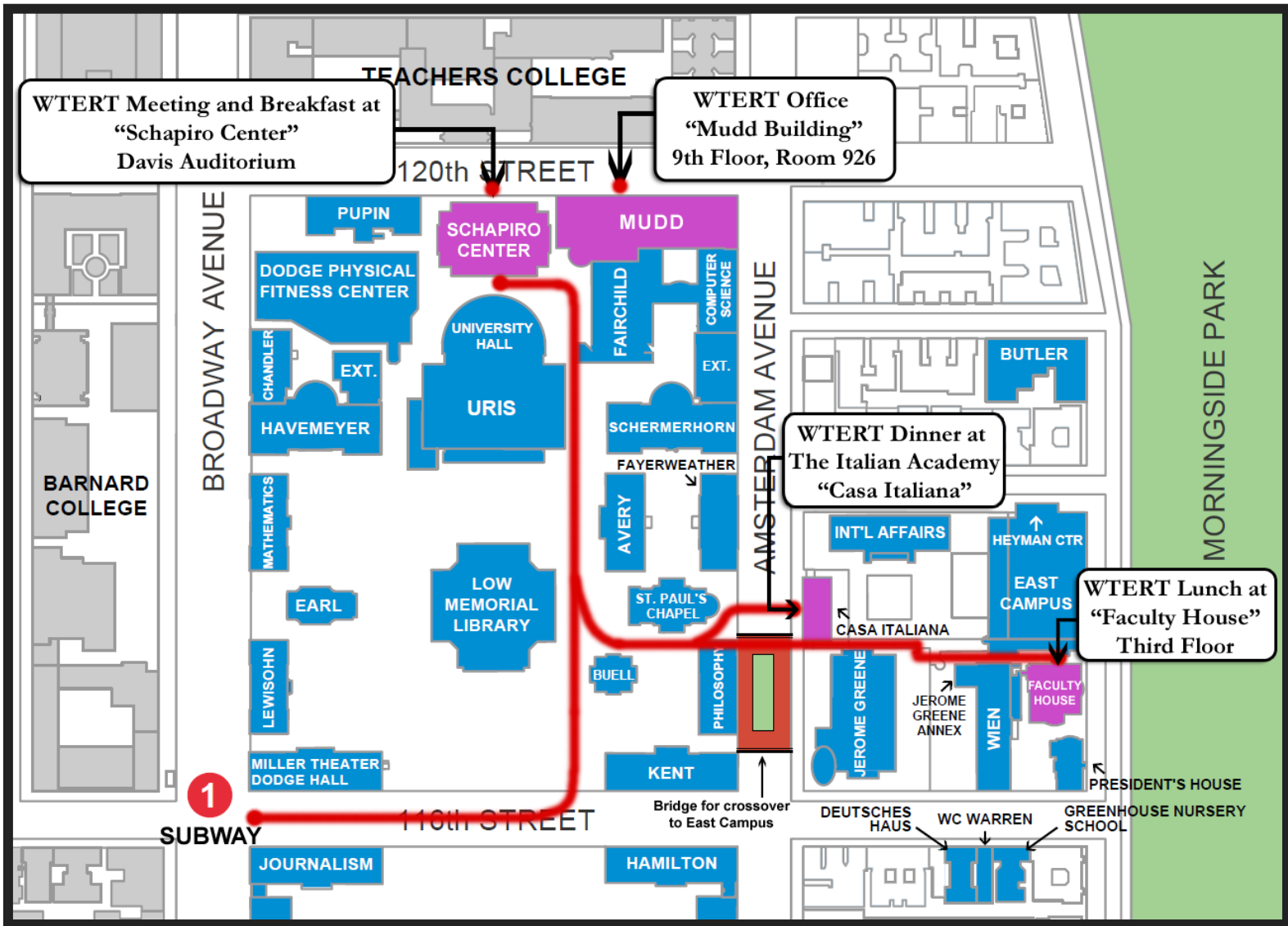
You can find the WTER Program and information on NYC accommodations near Columbia University, and other information about the WTER 2010 Bi-Annual Meeting by going to the WTER web (www.wtert.org).

Directions to the WTER 2010 Meeting

Take Subway 1 to 116th Street, Buses M4, M11 or M104 from locations in Manhattan or Bus M60 from La Guardia Airport. Follow map of Columbia Morningside Campus below, or ask personnel at Columbia Gates for directions to Davis Auditorium.

For more information on WTER 2010 meeting, please contact Mr. Marc Langenohl
E-mail: lm2712@columbia.edu; Tel: 1-212-854-9136; Fax: 1-212-854-7081

Map of Columbia University's Morningside Campus



COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK
EARTH ENGINEERING CENTER

Shapiro Center
WTERT Meeting and Breakfast



Faculty House
WTERT Lunch



The Italian Academy
“Casa Italiana”
WTERT Dinner



Accommodation in New York City

There are a number of hotels close to campus on Manhattan's Upper West Side. When calling one of these hotels, mention Columbia University to obtain the best rate.

BEACON HOTEL

2130 Broadway (and 75th St.)
(800) 572-4969 and (212) 787-1100

ON THE AVE HOTEL

222 West 77th St. (and Broadway)
(800) 509-7598 and (212) 362-1100

HUDSON HOTEL

356 West 58th St. (and 9th Ave.)
(800) 606-6090 and (212) 554-6000

THE NEW YORKER HOTEL

481 8th Avenue (and 34th Street)
(866) 800-3088 and (212) 971-0101

LUCERNE HOTEL

201 West 79th St. (and Amsterdam Ave.)
(800) 492-8122 and (212) 875-1000

COOL ALTERNATIVES:

A number of boutique hotels are also available, just a short subway or taxi ride away from campus. The ones below are some of our favorites. All are clean and newly renovated. Some are on the "funkier" side (check out their Web sites to see what we mean) but all are quintessentially New York!

THE PARAMOUNT HOTEL Times Square

235 West 46th Street (and 8th Avenue)
866-43-MELIA

DREAM HOTEL Midtown

210 West 55th Street (and Broadway)
866-437-3266

HOTEL GRACE

125 West 45th Street (and Broadway)
212-354-2323

THE TIME HOTEL Times Square

224 West 49 Street (and 8th Avenue)
212-246-5252

NEWER ADDITIONS:

A few new moderately priced (for New York!) hotels recently opened just northwest of Times Square. The subway is a block away and you can reach campus in 20 minutes (and even faster by taxi).

HILTON GARDEN INN Times Square

790 Eighth Avenue (and 48th Street)
800-HILTONS or 212-581-7000

HAMPTON INN Times Square North

851 Eighth Avenue (and 51st Street)
800-HAMPTON or 212-581-4100

MAJOR HOTEL CHAINS:

Most hotel chains are also represented in Manhattan. Some are listed below but ask each for other available properties. All are within easy reach of Columbia by taxicab or public transportation.

COURTYARD MARRIOTT Times Square

114 West 40th St. (and Broadway)
(800) 321-2211 and (212) 391-0088

MARRIOTT MARQUIS Times Square

1535 Broadway (and 45th St.)
(800) 228-9290 and (212) 398-1900

DOUBLETREE HOTEL Times Square

1568 Broadway (and 47th St.)
(800) 222-8733 and (212) 719-1600

SHERATON NEW YORK Midtown

811 7th Ave. (and 53rd St.)
(888) 625-5144 and (212) 581-1000

NEW YORK HILTON Midtown

1335 Avenue of the Americas (and 53rd St.)
(800) 445-8667 and (212) 586-7000

W NEW YORK Times Square

1567 Broadway (at 47th St.)
(212) 930-7400

LESS EXPENSIVE ALTERNATIVES INCLUDE:

COMFORT INN-CENTRAL PARK WEST

31 West 71st Street (between Central Park West &
Columbus Avenue)
(877) 727-5236 or (212) 721-4770

TRAVEL INN

515 West 42nd Street (between 10th & 11th Avenues)
(800) 950-1363 or
(212) 695-7171

HOLIDAY INN EXPRESS NEW YORK CITY FIFTH AVENUE

15 West 45th Street
(877) 863-4780 or
(212) 302-9088

LOWER BUDGET ACCOMMODATIONS INCLUDE:

HOTEL BELLECLAIRE

250 West 77th St. (and Broadway)
(877) 468-3522 and (212) 362-7700

UNION THEOLOGICAL SEMINARY GUEST ROOMS

3041 Broadway (and 121st St.)
(212) 280-1313

HOSTEL INTERNATIONAL NEW YORK

891 Amsterdam Ave. (and 104th St.)
(212) 932-2300

Parking Near Columbia University

Street parking may be found in the neighborhood (RARE!) and the following parking garages are located in the Columbia neighborhood:

- Riverside Church 120th St. between Riverside Dr. & Claremont Ave. (212) 870-6736
- Hospital Parking 114th St. between Broadway & Amsterdam Ave. (212) 523-1051
- GGMC 122th St. between Broadway & Amsterdam Ave. (212) 865-1754
- Morningside Garage Broadway at 124th Street (212) 864-9877
- Park Yorkshire 108th St. between Columbus & Amsterdam Ave. (212) 865-2314
- E & B 108th St. between Columbus & Amsterdam Ave. (212) 865-8315
- Westside Parking 108th St. between Broadway & Amsterdam Ave. (212) 222-8800