



Earth Engineering Center  
CITY COLLEGE of NEW YORK

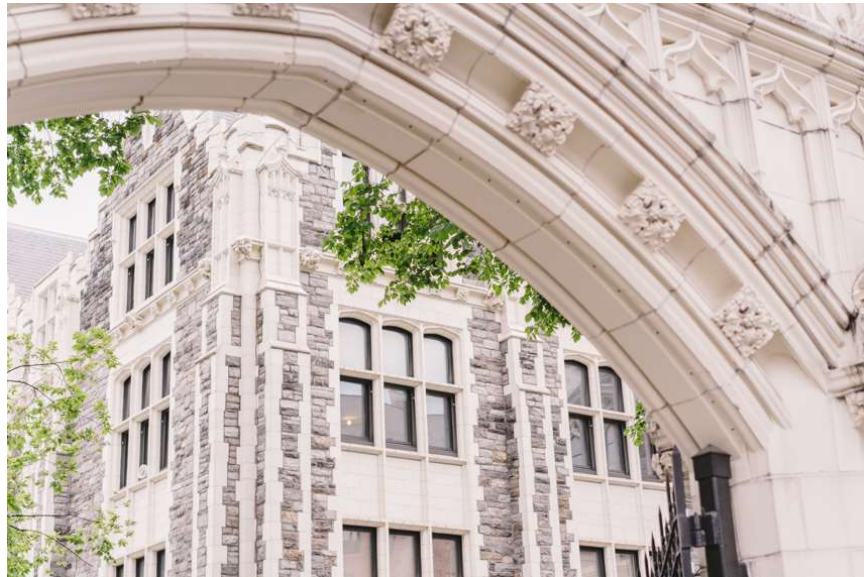


**WTERT**

## **2018 EEC/WTERT Bi-Annual Conference**

*Sustainable Waste Management: The Forefront of Innovation*

### **PROGRAM OF EVENTS**



**October 4<sup>th</sup> – 5<sup>th</sup>, 2018**

The Grove School of Engineering,  
275 Convent Ave, New York, NY 10031

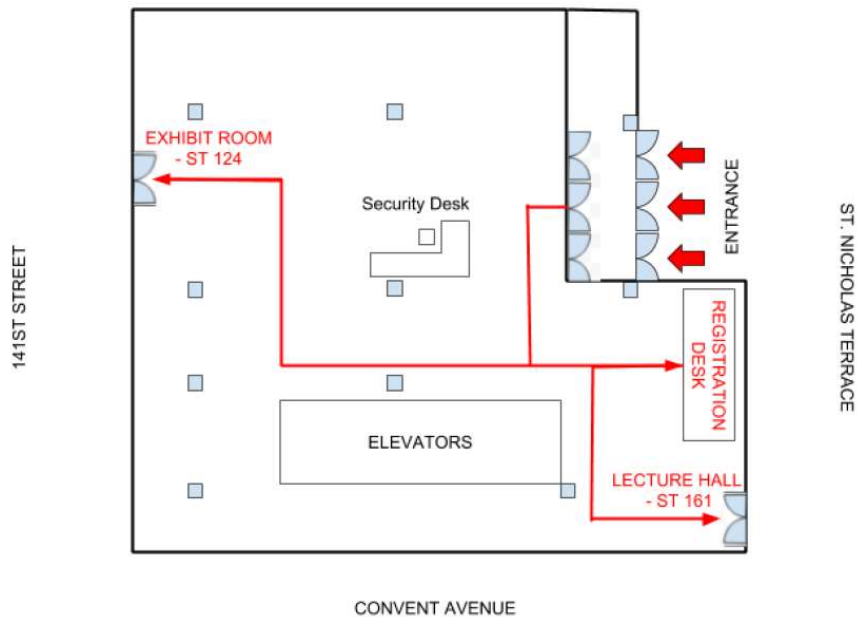
The City College  
of New York

[www.cnyeec.org/2018-wtert-conference](http://www.cnyeec.org/2018-wtert-conference)

# City College of New York North Campus Map



# Grove School of Engineering Ground Floor Map



# DAY 1 – OCTOBER 4<sup>TH</sup>, 2018

08.30 – 09.30	Light Breakfast	ST-124
09.00 – 11.00	Session 1 - Opening Plenary	ST-161
<b>Welcome</b>	▪ Prof. Marco J. Castaldi, CCNY	
<b>Address</b>	▪ Dean Rosemarie Wesson, CCNY	
<p align="center"><b>Cristina Garcia – Policy Advisor, NYC Mayor’s Office of Sustainability</b></p> <p>New York City is the largest city in the United States, with more than 8.5 million residents and more than one million buildings. In 2014, NYC Mayor Bill de Blasio committed to reduce citywide GHG emissions by 80% from 2005 levels by 2050 (80x50) —the level that the United Nations projects is needed to avoid the most dangerous effects of climate change. NYC’s climate plans focus on our energy supply, transportation, waste and buildings. Today, the energy used in New York City’s buildings accounts for nearly 70% of citywide GHG emissions, and the vast majority of our buildings will still be here in 2050. Because of this the Mayor’s Office of Sustainability has programs and policy to reduce the energy waste of buildings (e.g. Community Retrofit NYC, The NYC Carbon Challenge and The NYC Retrofit Accelerator).</p>		
<p align="center"><b>Henrietta Goddard – Research Analyst, Ellen MacArthur Foundation</b></p> <p>The Ellen MacArthur Foundation was launched in 2010 to accelerate the transition to a circular economy. Looking beyond the current ‘take, make and dispose’ linear model, a circular economy is restorative and regenerative by design. Relying on system-wide innovation underpinned by a transition to renewable energy sources, it aims to redefine products and services to design out waste, while minimising negative impacts. With the support of its Core Philanthropic Partners SUN, MAVA and People’s Postcode Lottery, and Knowledge Partners Arup, IDEO, McKinsey &amp; Company and SYSTEMIQ, the Foundation’s work focuses on the interlinking areas of governments, cities, businesses and learning institutions. Through activities such as collaborative workshops, formal and informal learning, and the production of case studies, articles and reports, the Foundation provides an environment for fostering learning and systemic innovation on the path to a circular economy.</p>		
<p align="center"><b>Commissioner Kathryn Garcia – Department of Sanitation of New York</b></p>		
<p align="center"><b>Paul Davison – Managing Director, Proteus Communications Group, UK</b></p> <p>America is at the dawn of a new golden age for energy from waste (EfW), but the technology still has an out-dated reputation, which could cause widespread public opposition. EfW needs more than a simple PR exercise. To change public attitudes, we must first understand the fundamental human behaviours that are the basis for opposition. Using experience from around the world, this presentation will demonstrate that there is a lot of work that needs to be done before EfW developers start talking about specifics. This presentation will not only explain the reasons for public opposition to EfW but, more importantly, it also will show the benefits from an alternative positive approach to community engagement. Using this new approach with three levels of communications, it is possible to deliver approval for a new EfW plant, without any significant public opposition, in less than nine months.</p>		
11.00 – 11.15	Break	
11.15 – 12.30	Session 2	ST-161
<p align="center"><b>Mallory Szczepanski – Editorial Director, Waste 360</b></p> <p align="center"><i>Building the Future of Waste and Recycling</i></p> <p>The waste and recycling industry is an ever-changing industry. And as the industry faces current challenges like adapting to China’s waste import ban, making materials cleaner for end markets and finding new solutions for cutting down on waste, members of the industry are exploring new opportunities for waste reduction and recycling. In this session, some of those opportunities and recent developments will be discussed.</p>		
<p align="center"><b>Demetra Tsiamis – Associate Director, EEC CCNY</b></p> <p align="center"><i>Waste Flow Methodology</i></p> <p>Effective waste management infrastructure is dependent on the reliability and accuracy of waste data. The purpose of this study was to quantitatively understand the methodologies behind municipal solid waste (MSW) statistics in the United States (US) and the European Union (EU), with the ultimate goal to gain insight into discrepancies in data and how they can be resolved. This study provides an in-depth analysis of the materials flow methodology of the United States Environmental Protection Agency (US EPA) and presents quantitative elaborations of the methodology for primary material streams in MSW.</p>		
<p align="center"><b>Craig Cookson – Senior Director, Recycling &amp; Energy Rec., American Chemistry Council</b></p> <p align="center"><i>Creating a Circular Economy for Post-Use Plastics in the USA</i></p>		

**Prof. Hillary Brown, Director of CCNY Interdisciplinary Urban Sustainability Program**

*An Infrastructural Commons: Sustainable Waste Management and Multiple Use Facilities*

The idea of an “infrastructural commons”—defined as a self-optimizing arrangement for resource management—could hold promise for a next generation of urban systems. The commons metaphor advances a more multi-objective, and holistic approach for delivering energy, water, sanitation, transportation, and waste management services. The idea of an infrastructural commons transcends conventional, mono-sectoral planning and management of these public services. It operates in two different modes. First, it stipulates that undervalued residuals from one infrastructural sector be made available for beneficial use by another. Examples illustrate how reciprocal exchanges of waste-energy, -water, or -resources across different systems can produce synergistic economic and environmental benefits. The second mode of the infrastructural commons is the shared use of the infrastructural facility space itself by the general public. Several examples variously depict the compatible, simultaneous use of an infrastructural campus for educational, cultural or recreational purposes.

12:45 – 13:30

Lunch

NAC 3<sup>rd</sup> Fl.

13.30 – 15.30

Session 3

ST-161

**Dereth Glance, Executive Director, Onondaga County Resource Recovery Agency**

*Trash to Treasure: Climate and Community Benefits from Sustainable Resource Recovery in Upstate New York*

Waste-to-energy plays a vital role in Onondaga County’s comprehensive solid waste management system. It offers an innovative way to manage trash locally, reclaim thousands of tons of metal and reduce greenhouse gas impacts by minimizing landfilling. Find out how waste-to-energy helps Onondaga County recover resources for their highest use. The agency’s waste management facilities including energy recovery, transfer, and compost. With the help of OCRRA, Onondaga County residents save the world a little each day by using waste-to-energy to help make our community a more sustainable and healthy place to live.

**Prof. Carlo Vandecasteele, University of Leuven, Belgium**

*Co-combustion of Calorific Solid Waste and Wet Sludge in a Fluidised Bed: Flanders as a Model for New York*

**Christophe Cord’Homme – Development Director, Environment and Renewable Energies Sector, CNIM Group**

*How CNIM Designs State of the Art Automation for Material-from-Waste or Energy-from-Waste Modern Facilities?*

Municipal Solid Waste is an important sustainable source of material and low-carbon renewable energy. Material-from-Waste and Energy-from-Waste (EfW) plants contribute to the diversion of biodegradable municipal waste from landfill and secure a noteworthy reduction of greenhouse gas emissions. Automation and information technologies are a forefront of innovation in our daily lives, but also in industrial sectors. The objective of this presentation is to understand what are the activities and projects of CNIM regarding this fashion topic for a sustainable waste management. CNIM is an international integrated company supplying turnkey Design & Build (EPC) completed by Operations & Maintenance services for municipal solid waste treatment facilities. CNIM is designing state of the art automation for Waste-to-Energy or waste sorting facilities and is proposing innovation, which should be adapted to this specific industrial sector.

**Distinguished Prof. Ange Nzihou – Ecole des Mines/University of Toulouse, France**

*French Perspective on Waste Management and Valorization*

Among the timely issues linked with Waste to Energy (WTE), the monitoring and online analysis of pollutants are of particular interest. This presentation will report the ongoing work aiming at anticipating the reduction in mercury emission threshold in WTE plants including the prospect of a continuous measurements requirement. The effects of the operating conditions on the mercury abatement will be studied. The impact of the other gas such as HCl, NO and SO<sub>2</sub> on mercury emissions will be also discussed. The proposed work aims at the metrological characterization of mercury emissions, in its different forms and at different points of an installation in an industrial scale, equipped with a dry-flue gas treatment, in order to establish the balances to determine the fate of mercury, while identifying the different mechanisms involved.

**Dr. Ralf Koralewska, R&D/Technology Director, MARTIN GmbH**

*Emerging Approaches for Waste-to-Energy – Potential of Innovative Technologies and Synergies*

Thermal treatment of waste using grate-based systems has gained world-wide acceptance as the preferred method for sustainable management of residual waste. But in order to maintain this position and respond to new challenges and/or priorities, it is necessary to develop and implement innovative technologies. In addition, synergies between different waste treatment processes and/or technologies and various waste streams must be determined. With long term worldwide partnerships (cooperations/joint ventures/licences) and innovative technologies MARTIN guarantees that also in the future waste is treated in accordance with ecological and economic constraints and in compliance with legal requirements. The presentation documents that innovative technologies and synergies successfully provide solutions for optimizing Waste-to-Energy technologies in terms of climate and resource protection, reduction of environmental impacts as well as political, regulatory and market aspects.

**Prof. Marco Baratieri, Free University of Bozen-Bolzano, Italy**

*A Case Study of Gasification CHP in the European Context and Comparison to Traditional Combustion Systems*

In the last years, there was an increasing number of small-scale biomass gasification systems for combined heat and power (CHP) generation, i.e. 1040 plants installed in Europe from 2009 to 2017. In northern Italy, 50 plants based on various technologies and installed in a rather small area allowed to carry out an extensive comparative analysis on a representative set of this kind of commercial CHP units. This paper provides the relevant results in an actual state-of-the-art of small-scale biomass gasification technologies, in terms of energy efficiency, effectiveness of the adopted solutions and characteristics of the products and by-products, also proposing new valorization routes for the residues. A comparison with traditional combustion technologies is presented for the Italian context both considering biomass as feedstock and also showing the recent advancements for municipal solid waste.

15.30 – 15.45

Break

15.45 – 17.00

Session 4

ST-161

**Steve Simmons – Senior Vice President, Gershman, Brickner & Bratton, Inc.**

*Energy Recovery in Resource Recovery Parks*

Resource Recovery Parks can provide critical infrastructure implementation of sustainable waste management programs by combining waste material sorting, processing, upgrading and product manufacturing in a co-located symbiotic relationship. This presentation will examine how one community, is transforming its 20th Century, Integrated Waste Management System into a 21st Century, Sustainable Materials Management System. The Kent County Michigan's waste management system is comprised of a transfer station, a material recovery facility, a waste to energy facility and a landfill. Established in the 1980's, the system has served the needs of the community's residents and businesses for three decades. But the community has outgrown the system. Today the community landfills more waste than it converts into energy. Its leading industries are demanding zero waste to landfill options. In 2016, the County DPW launched its Reimagine Waste campaign with a goal of reducing the waste it landfills by 90 percent by 2030. This presentation will review the County's progress towards that goal.

**Prof. Alex Godoy – University of Santiago, Chile**

*Chilean Perspective on Waste Management and Recent Actions Taken.*

In Chile, the Waste Management has begun to involve the materials and energy recovery processes. In terms of materials, the recycling has been promoted through Extended Producer Responsibility (EPR) by the recovery of plastics, paper, cardboard, glass, and scrap. However, energy recovery has begun to be considered as an option to landfilling as final disposal. The energy recovered can support the local energy generation fostering the smart grids. Today, Chile has one Nationally Appropriate Mitigation Action (NAMA) related to biogas's production; nevertheless, the government has started the evaluation of Waste to Energy technologies. In this presentation, we show the results of the Ministry of Energy according to the first pre-feasibility study of a waste-to-energy plant in Santiago. We compare these results with the previous studies at EEC as well as the environmental challenges that have been not resolved.

**Prof. Jean-Michel Lavoie – University of Sherbrooke, Canada**

*Opportunities for the Utilization of Forest Residues Combined with PtX in Quebec and in Canada*

Biofuels represent a very promising option allowing solving many challenges with a single solution. In this work will be presented a combination of disruptive approaches, targeting renewable carbon sources (forest biomass & carbon

dioxide) as the feedstock for a new and competitive bioeconomy. These approaches, developed by the Biomass Technology Laboratory (Canada) have been designed and tested up to pilot scale and are now ready for large scale deployment. Such technologies, although designed specifically in the situation of Quebec (Canada) could still be applied everywhere across the globe where forest biomass and renewable electricity is available.

**Prof. Marco J. Castaldi – Director, EEC|CCNY**

*EEC|CCNY Activities*

This presentation will provide an update on the range of research and other activities done by the Earth Engineering Center at City College during the past two years. Results of new initiatives regarding metal recovery from WTE Ash to investigation of corrosion mechanisms for new alloys for WTE facilities will be briefly covered. Important publications and media coverage will be summarized including some public education documents recently released. Finally, some current projects and new collaborations will be highlighted. The goal of this update is to demonstrate the extensive work being done at EEC|CCNY spanning the entire waste management spectrum.

17.00 – 18.00	Session 5: Poster Session & Cocktail Hour	ST-161
18.20 – 21.00	Gala Dinner	SH-250

**DAY 2 – OCTOBER 5<sup>TH</sup>, 2018**

08.30 – 09.30	Light Breakfast	ST-124
09.00 – 10.30	Session 6	ST-161

**Prof. Nickolas Themelis – Chair, Global WtERT Council**

*A Brief Introduction to the Global WtERT Council (GWC)*

The Waste-to-Energy Research and Technology Council (WtERT) was founded in 2002 by the Earth Engineering Center of Columbia University and the U.S. Energy Recovery Council. Over the years, universities and research institutes in several countries, have formed sister WtERT organizations. Some of them are presenting at this Conference and the Chair, Prof. Castaldi heads the WtERT-US organization. In 2011, the Global WtERT Council (GWC) was registered as a non-profit corporation in the State of New York with the mission to identify the best available technologies for the recovery of materials and energy from urban, industrial and other residues of human activity, stimulate research and development in sustainable waste management, and disseminate this information by means of the web pages, publications, and conferences of its sister organizations. Since its inception, GWC has become the world's best known academic-industry association in the area of sustainable waste management. Its major accomplishments are many published studies of materials and energy recovery technologies, several pre-feasibility studies of waste-to energy (WTE) projects, and the WTE Guidebook (see Google) which by now has been translated into four other languages.

**Prof. A.C. (Thanos) Bourtsalas – Columbia University**

*2017-18 Activities of the Earth Engineering Center of Columbia University*

A study on the mercury emissions from all the Waste-to-Energy plants in the US, showed that the 77 U.S. WTE plants emitted 0.4 tons of mercury, corresponding to 0.73% of the U.S. industrial emissions of mercury. An LCA study showed that adding a Selective Catalytic Reactor (SCR) to WTE plants using non-catalytic reduction of nitrogen oxides is not environmentally preferable but would be necessary for meeting NOx standards below 50 ppmdv NOx @ 7% O<sub>2</sub>. An environmental and market analysis of processes for resource recovery from waste-to-energy bottom ash in the US showed that Florida, Pennsylvania, Virginia, New York, Connecticut, and Massachusetts are promising markets for the beneficial use of bottom ash. A pre-feasibility study of a 200,000 ton per year waste-to-energy plant in Chile showed that it would be economically viable with current prices of gate fee and electricity. Other research and international activities of the EEC-Columbia will be discussed.

**Prof. Qunxing Huang – Zhejiang University, China**

*Progress of WTE Technologies in China*

<b>Prof. Costas Velis – University of Leeds, UK</b>		
<i>Waste and Resources Management Systems Performance in Megacities Around the World</i>		
<b>Bruce Howie, P.E., Vice President, Professional Associate, HDR Inc.</b>		
<i>State of WTE Industry in North America</i>		
<b>10.30 – 11.00</b>	<b>Break</b>	
<b>11.00 – 12.00</b>	<b>Session 7</b>	<b>ST-161</b>
<b>Prof. Maria Loizidou – National Technical University of Athens, Greece</b>		
<i>Movement Toward Circular Economy and E.U. Waste Management Regulation</i>		
<p>The presentation refers to the recent developments in European Union towards circular economy. It presents the EU Action Plan for Circular Economy including the key action areas (production, consumption, waste management, secondary raw materials and innovation, investment &amp; monitoring) and the five priority sectors (plastics, food waste, construction &amp; demolition waste, critical raw materials &amp; biomass &amp; bio-based products). The objectives and the key actions are presented in each case. The EU package for Circular Economy is ambitious hoping to create 3.4 million new jobs in EU until 2030, achieve savings for businesses and reduce greenhouse gases. Member States should reduce MSW ending at landfills to 10% until 2030 and Waste-to-Energy can contribute substantially towards this direction, keeping in mind that separately collected waste is not incinerated unless incineration delivers a better environmental outcome. Finally, the presentation makes reference to some 'good practice' examples of implementing circular economy with emphasis to waste management in isolated areas like islands.</p>		
<b>Enrique Posada Restrepo, President, WtERT/Colombia</b>		
<i>Need for Sustainable Waste Management in Colombia</i>		
<p>Colombia is a country located in South America, with special historical, geographical, demographic and cultural antecedents that play an important role in the genesis of many problems, including waste management. Although there is a clear need for sustainable waste management, there are important barriers. Some of them are considered and discussed in relationship to options for developing WTE projects. The Colombian electricity companies seem to consider WTE projects that produce electricity only from the point of view of comparing investment cost per kilowatt installed and the cost of generation per kilowatt-hour, to hydroelectric, wind or solar projects. This in general leads to conclude that the generation of electricity from MSW is neither profitable nor viable. This conclusion is also felt in the companies and entities of the waste sector. Of course, in this way, the integral, comprehensive picture is not included, as the waste sector must consider a more sustainable and broader perspective and see electricity generation as one aspect of WTE and not the only goal. The interests of the electricity sector and the waste management sector, apparently, are not the same and do not seem to coincide. But there is a common ground to consider, which is sustainability and the need to integrate solutions looking for the real (evident and hidden) cost and benefits to society. To help provide some perspective on this matter, the authors present here a model of application of WTE to solid waste in Colombia.</p>		
<b>Prof. Stergios Vakalis – Free University of Bozen-Bolzano, Italy</b>		
<i>Applications of the 3T Method as an Efficiency Assessment Tool for Waste-to-Energy Facilities and Numerical Comparisons with the R1 Formula</i>		
<p>This study will present the numerical results from the analysis of waste-to-energy plants both with the R1 formula and with the 3T method and will compare the accuracy of each approach. It has to be stated that the methods do not have a same value system and the final efficiencies that they calculate are not comparable. For the case of the R1 formula, the facilities that attain values over 0.65 (or 0.6 for older plants) achieve the R1 status. It is usually the case, that efficient co-generation plants can achieve values that are significantly higher than that. On the other hand, conventional waste-to-energy plants achieve values of 0.2 – 0.3 with the 3T method. The comparison of the methods becomes very interesting for the case of gasification or pyrolysis plants where the R1 formula is not able to take into consideration other final products except the CHP, like char or bio-oil.</p>		
<b>12.00 – 12.30</b>	<b>Wrap-up</b>	
		<b>ST-161</b>

## ACKNOWLEDGMENTS

Thank you to all speakers and participants.

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**Martin GmbH**

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