

WTERT

Waste-To-Energy Research
and Technology Council



PROGRAM OF

WTERT 2008 Bi-Annual Meeting at Columbia University

NEW YORK CITY, OCTOBER 16 & 17, 2008

Location: Davis Auditorium, Schapiro Center for Engineering and Physical Science Research, Foundation School of Engineering and Applied Science, 520 West 120th St. (between Broadway and Amsterdam Avenue), New York City

You can register as of August 30 on the [web](#)

THURSDAY AM, OCTOBER 16, 2008

8:15 AM Registration and continental breakfast in lobby of Davis Auditorium

The sponsorship of the breakfasts of October 16 & 17 by [HDR Engineering](#) is gratefully acknowledged

9:00AM **Welcome to Columbia University: Prof. Klaus Lackner**, Chair, Department of Earth and Environmental Engineering and Director of Lenfest Center for Sustainable Energy, Columbia University.

9:15AM **Introduction to WTERT 2008 Bi-annual Meeting: Prof. Nickolas J. Themelis**, Director of Earth Engineering Center, Columbia University and WTERT Chair. Outline of 2008 Program; recognition of the finalists nominated to the WTERT 2008 Industrial Advance Award and the Outstanding Contribution to WTE Award.

9:30 AM **International Session 1 - Session Chair: Mr. Frank Ferraro**, Wheelabrator Technologies and Chair of IWSA Board.

The AEB Amsterdam Waste Fired Power Plant (WFPP): Ms. Hanneke van Rhee, AEB Amsterdam (Rhee@afvalenergiebedrijf.nl)

AEB Amsterdam is 100% owned by the City of Amsterdam. The company has designed, built and operated WTE facilities for more than 85 years. With the 2007 addition of the 530,000 tonnes/year Waste Fired Power Plant, AEB has now the largest WTE facility in the world with a total capacity of 1.5 million metric tons per year. This 4th generation WTE is designed to provide the grid with electricity corresponding to 30% of the input heating value, the world's highest from MSW fuel. Ferrous and non-ferrous metals are recovered from the bottom and fly ash with efficiency well above 90%. Ash is then turned into sand and granulate used for building materials. Only about 2 % of the total solids are land-filled. Silver and copper are recovered and air emissions are less than 20% of EPA standards.

Questions/discussion

10:00 AM **The Isseane plant in Paris - Integrating a waste-to-energy facility into a major city: Mr. Peter Chromec, Von Roll Umwelttechnik AG, Switzerland**
(peter.chromec@aee-vonrollinova.ch)

The new Isseane WTE/EfW facility in Paris consists of two units of total annual capacity of 460,000 metric tons and uses the VonRoll Inova grate technology, from feed hopper to stack. It is located near the center (four kilometers from Eiffel Tower) of the most visited city of the world and on the shore of the river Seine. Its location required special planning and design characteristics that will be described in this presentation. It will include conditions that were considered in planning and design concept (visual impact, technical data, plant layout), challenges encountered during construction, and initial operating experience.

Questions/discussion

10:30 AM **Coffee Break (15 minutes)**

10:45 AM **International Session 2 - Session Chair: Mr. Ted Michaels, President, Integrated Waste Services Association (IWSA).**

WTE Growth in China: President Tang Yi Ke and Prof. Zhou Xiong, Chongqing University of Science and Technology (CQUST; cq_mecc@yahoo.com.cn)

Rapid development in China and population growth in urban centers has resulted in massive generation of MSW and a dearth of land-filling space. China has adopted both fluidized bed and traditional grate technologies. Chongqing Steel has already built two mass burning plants and has joined with Covanta Energy in forming a WTE company that is planning to build several WTEs. This industrial activity has also encouraged the formation of an entire department dedicated to advancing waste-to-energy technology at the Chongqing University, one of the largest universities in China. In addition, a sister organization to Columbia's Earth Engineering Center has been formed at CQUST (www.wtert.cn).

Questions/discussion

11:15 AM **Problems and Opportunities in implementing WTE in the smaller E.U. nations: a) Prof. Avraam Karagiannidis**, Aristotle University of Thessaloniki (makis@aix.meng.auth.gr); and b) **Dr. Efstratios Kalogirou**, INTRAKAT Co., Greece (stkal@intranet.gr)

Problems and Opportunities in implementing WTE in the smaller E.U. nations: a) Prof. Avraam Karagiannidis, Aristotle University of Thessaloniki (makis@aix.meng.auth.gr); and b) Dr. Efstratios Kalogirou, INTRAKAT Co., Greece (stkal@intranet.gr). This is a joint presentation by two members of the managing board of the WTERT sister organization in Greece (www.wtert.gr). Prof. Karagiannidis will describe existing thermal treatment applications in Greece for certain waste streams (e.g. hospital wastes, biomass, LFG-use), constraints facing new WTE plants for mixed residual waste, and problems encountered regarding RDF/SRF utilization. Dr. Kalogirou will then discuss the future of WTE in Greece and the Balkans as viewed by a major Greek company that considers mass-burning WTE facilities to be the best solution for managing post-recycling MSW in Greece.

Questions/discussion

11:45 AM **Implementation of the Plasco Conversion System (PCS) in Ottawa, Canada: Mr. Andreas Tsangaris**, Plasco Energy Group (atsangaris@plascoenergygroup.com)

The Plasco Conversion System is a plasma-assisted conversion process that is being tested at an 85 tonnes/day prototype plant in Ottawa. As-received MSW is fed into the primary chamber of the process where it is gasified by heat recovered from the gases exiting the refining chamber, into carbon monoxide, hydrogen, large hydrocarbon molecules and un-reacted carbon. This gas is then refined in another chamber to produce predominantly hydrogen and carbon monoxide as the fuel gases by reacting with air and providing additional heat by a plasma torch. The refined gas stream passes through a heat recovery unit and is then cooled further and cleaned of particulates, metals and acid components. The solid residue from the gasification chamber flows into a separate chamber, equipped with a second plasma torch, where it is melted and then quenched into glass-like pellets. In the PCS, electricity is generated both by combustion of the syngas in gas engines and also by using the recovered heat (combined cycle). The presentation will describe the economic and environmental advantages of PCS and provide performance data from the Ottawa plant. Projections for the 400 tonnes/day plant that is now on contract with the City of Ottawa will also be shown.

Questions/discussion

12:15 PM **Lunch will be served in Broadway Room, 2nd floor of Alfred Lerner Hall (see map)**

The sponsorship of this luncheon by [Wheelabrator Technologies](#), a company of Waste Management Inc., is gratefully acknowledged

THURSDAY PM, OCTOBER 16, 2008

- 2:00 PM** **Research and Technology Session 1 - Session Chair: Prof. Marco Castaldi,**
Earth and Environmental Engineering, Columbia University.
- Status of Energy from Biomass/Waste and Alternatives to Grate Incineration in E.U.: Dr. Juergen Vehlow,** Forschungszentrum Karlsruhe Institute for Technical Chemistry, Thermal Waste Treatment Division (Juergen.Vehlow@itc-tab.fzk.de)
- Status of energy generation from biomass/waste in E.U. and particularly in Germany: Comparison of the legal situation, present status, and trends in use of grate combustion of as received MSW (incineration) vs. the alternatives of producing refuse-derived-fuel (RDF) by Mechanical Treatment (MT), Mechanical-Biological Treatment (MBT), and Mechanical-Biological Stabilization (MBS). Actual key problems are quality control of the RDF and, because of that, capital and operating costs required for emission control when the RDF is used in power plants and industrial furnaces.
- Questions/discussion*
- 2:30 PM** **Corrosion of various metals under simulated WTE conditions; and Sequestration of HCl in WTE Combustion Chambers: Mr. Shang-Hsiu Lee,**
Earth and Environmental Engineering, Columbia University (sl2304@columbia.edu)
- At the suggestion of WTE engineers experienced with boiler corrosion, an apparatus was constructed that allowed to develop a temperature gradient between the surface of a metal coupon and a highly corrosive gas flow. This allowed examining the resistance of various metals and alloys in WTE combustion chambers under accelerated conditions. The second part of this report will present the results of corrosion tests where the HCl in the gas flowing through the furnace was sequestered in the form of calcium chloride by injecting a spray of calcium hydroxide into the gas flow. The results showed an appreciable decrease in corrosion as a result of the HCl sequestration.
- 2:45 PM** **A Superior Coating Method for Protecting WTE Boiler Tubes: Mr. Y. Matsubara,** Dai-Ichi High Frequency Co. Ltd., Kawasaki, Japan (y-matsubara@dhf.co.jp)
- A nickel-based self-fluxing alloy for coating WTE boiler tubes has been developed that is fused by induction heating and is in service at several WTE facilities. This alloy has been shown to greatly extend the service of boiler tubes due to its excellent corrosion resistance. Induction heating results in a much better bond of the coating with the tube metal, minimizes the inclusion of pores, and reduces stress on the tube. This coating can be applied at a lower cost than the conventional method of Inconel welding. In one test, eleven units consisting of five six-meter long tubes per unit were placed in a WTE boiler in Taiwan in 2003 and after five years of service have shown virtually no corrosion. In all, there are now over 600 such units in operation, both on the walls and the roof of WTE combustion units.
- Questions/discussion on two corrosion papers*

3:15 PM Coffee Break (15 minutes)

3:30 PM Research and Technology Session 2: Session Chair: Dr. Juergen Vehlow,
Forschungszentrum Karlsruhe Institute.

Development of a new metric for comparing LCA effects of different waste management routes - The Resource Conservation Efficiency (RCE):Dr. Scott Kaufman, Lenfest Center for Sustainable Energy, Columbia University (smk2108@columbia.edu)

Typically, the environmental performance of municipal solid waste (MSW) management is judged by the recycling rate of a community. However, materials recycling is not the only way to conserve resources. Energy recovery – from waste to energy (WTE) plants or from landfill gas – may also contribute to improved environmental performance. Therefore, a new metric was developed, called resource conservation efficiency (RCE), that measures the lifecycle energy efficiency of different materials and varies depending on the recyclability of the material as well as the method chosen to dispose of non-recycled materials. To determine the validity of RCE as an environmental metric, life cycle impact assessment (LCIA) was performed. It was shown that the cumulative energy demand for different materials in the MSW stream correlates strongly with EcoIndicator 99 scores, a common LCIA environmental evaluation tool. This demonstrated the validity of the RCE as a measure of resource conservation and also “environmental efficiency”. For example, San Francisco, which has a higher recycling rate than Honolulu, scored a lower RCE than the latter because of its higher rate of land-filling.

Questions/discussion

3:50 PM The European experience for NO_x removal from WTE process gas: Selective Non-Catalytic Reduction (SNCR) or Selective Catalytic Reduction (SCR): Ms. Bettina Kamuk, Ramboll Denmark (BKC@ramboll.dk)

Now that modern WTEs have been fully successful in removing mercury, dioxins and other contaminants from their stack gases, a new topic of discussion in the U.S. is what the best way to further reduce the NO_x concentration. Ramboll recently undertook an analysis of European operating data as to emission levels attainable with SNCR and SCR and also operating experience, capital, and operating costs of the two systems. This paper will also compare the annual total amounts of NO_x emitted from U.S. WTE facilities with some other sources such as automobiles and coal-fired power plants.

4:15PM The Covanta LN™ and VLN™ processes for reducing NO_x in WTE stack gas: Mr. Steve Goff, Covanta Energy, U.S.A. (SGoff@CovantaEnergy.com)

In the last two years, Covanta Energy Group has developed and commercialized a new technology for reducing NO_x emissions from energy from WTE (EfW) facilities. NO_x levels of 60 to 90 ppm have been reliably achieved, which is a reduction of 50% to 70% below the current EPA standard and typical performance of today’s WTE facilities. In the

Covanta LN™ process, a portion of the secondary air stream is diverted to a new tertiary injection system. The total air flow requirement of the process is not changed, making it ideal for retrofit applications. In the Covanta VLN™ process, the tertiary gas is an internal stream drawn from the combustion chamber. By using this internal gas stream, the excess air requirement is reduced, thus increasing the energy recovery efficiency of the process. Both the Covanta LN™ and VLN™ processes are combined with conventional, aqueous ammonia SNCR technology to achieve the superior NOx performance. The SNCR control system must also be integrated with the LN™ or VLN™ combustion controls to maximize the NOx reduction and minimize the ammonia slip. The technology has been demonstrated to decrease NOx emissions to levels well below any yet seen to date with SNCR alone, and are comparable to SCR systems. The result is a significant improvement in NOx control, resulting in much lower capital and operating costs.

Questions/discussion on two NOx papers

4:45 PM Gasification of Biomass: Prof. Marco Castaldi, Earth and Environmental Engineering, Columbia University (mc2352@columbia.edu)

The gas evolution and energy content of several types of wood, grass, and agricultural residues were examined with steam and CO₂ gasification using Thermo-gravimetric Analysis and Gas Chromatography. Using CO₂ as the gasification medium for the thermal processing of biomass fuels, results in more complete conversion to synthesis gas and higher energy efficiency. Varying the CO₂ amount introduced into the gasification reactor enables adjustment of the H₂/CO ratio produced to meet the optimal range for a wide variety of applications. Selection of the gasification parameters, such as heating rate, also enabled greater control in the separation of cellulose from lignin via thermal treatment. Finally, it will be shown that these findings are consistent for all carbon containing feedstock, such as coal and MSW.

Questions/discussion

5:15 PM Poster Session & Reception (Kellogg Center, 15th Floor, International Affairs Building, see map): Graduate students/researchers will be present to discuss the work presented in the posters

7:00 PM WTER Awards Dinner (Kellogg Center, 15th Floor, International Affairs Building, see map)

The sponsorship of the WTER Awards Dinner by the Solid Waste Processing Division of ASME International is gratefully acknowledged

- **Presentation of SWPD/ASME Scholarship Awards** (presentation of awards by Mr. Amit Chattopadhyay, SWPD-ASME)
- **Presentation of the WTER 2008 Awards:**

- **The WTERT 2008 Industry Award: To Covanta Energy for their development of the LN® and VLN® NOx reduction processes** (Presentation of award by Prof. Marco Castaldi)

The WTERT 2008 Industry Award recognized a very significant and firstly-implemented advance to the grate combustion (“mass burn”) WTE process. Nominations included advanced combustion control systems, oxygen enrichment and significant improvements in boiler-turbine thermal efficiency, novel NOx reduction systems, and ash processing systems (vitrification, physical separation).

- **The WTERT 2008 Outstanding Contribution Award: To Mr. Artie Cole of Wheelabrator Technologies** (presentation of award by Prof. N.J. Themelis)

The WTERT 2008 Outstanding Contribution Award sought nominations of individuals who as researchers, inventors, policy makers, or industrialists have made an outstanding contribution to advancing the recovery of energy from municipal solid wastes in a nation or region.

FRIDAY AM, OCTOBER 17, 2008 (THIS SESSION IS OPEN TO THE PUBLIC)

- 8:30 AM** **Breakfast in lobby of Davis Auditorium**
- 9:00 AM** **Greenhouse Gas and Economic Issues in Global Waste Management - Session Chair: Prof. N.J. Themelis, Earth Engineering Center, Columbia University.**
- Projected Generation of Global MSW, Current GHG Emissions and Potential for Mitigation: Prof. Nickolas Themelis** (njt1@columbia.edu)
- 9:15 AM** **2006-2008 Progress Made in Waste-to-Energy in Europe: Mr. Ferdinand Kleppmann, President, Confederation of European Waste-to-Energy Plants (CEWEP) and Dr. Ella Stengler, Managing Director, CEWEP** (ella.stengler@cewep.com)
- 9:40 AM** **USEPA Efforts to Reduce GHG Emissions of Solid Waste Management: Mr. William Brandes, USEPA, Office of Solid Wastes** (Brandes.William@epamail.epa.gov)
- 10:00 AM** **Recycling and Waste-to-Energy: Are They Compatible? Dr. Eileen Brettler Berenyi, Governmental Advisory Associates** (ebb@governmentaladvisory.com)

Critics of waste-to-energy have argued that building of new WTE facilities inhibits recycling and is an obstacle to communities’ efforts to recycle. A study of recycling rates at more than 500 communities in twenty-two states that rely on waste-to-energy for waste disposal showed that these communities recycle at a rate higher than the national average. Many have recycling rates at least three to five percentage points above the

national average and in some cases are leading the country in recycling. The study concluded that recycling and waste-to-energy are compatible waste management strategies and are practiced in many communities across the United States.

10:20 AM Coffee Break

10:35 AM Objectives and Current Status of Canadian Energy-From-Waste Coalition (CEFWC): Mr. John P. Foden (jpfoden@presterjohn.ca)

10:55 AM Energy and Green-House Gas Issues in the Updated New York State Waste Management Plan of NYS-DEC: Mr. John Waffenschmidt, Covanta Energy (jwaffenschmidt@covantaenergy.com)

11:15 AM Is this the time for the U.S. to be Wasting Energy? : Mr. John Williams, HDR Engineering (John.Williams@hdrinc.com)

The US commits the equivalent of hundreds of millions of barrels of oil to landfills each year at a time when energy issues pose a serious threat to our way of life. Each ton of combustible waste disposed of in a landfill is a missed opportunity to reduce our need for fossil fuels, our generation of GHG emissions, our reliance on foreign oil, and our need for long-haul transport by trucks or rail over congested roads and railroads.

11:30 AM Panel/audience discussion: Challenges and opportunities for waste management in large urban centers.

12:30 PM End of Meeting

You can find the WTERT Program and information on NYC accommodations near Columbia University, and other information about the WTERT 2008 Bi-Annual Meeting by going to the WTERT web (www.wtert.org) and linking to the meeting page.

PLEASE NOTE THE FOLLOWING SPECIAL EVENT PRECEDING THE WTERT MEETING, SPONSORED BY SWPD/ASME AND UNION COUNTY WTE OF COVANTA ENERGY:

Visit of Union County WTE plant, Rahway NJ: Wednesday October 15, 9:30 AM-2:30 PM:

Registrants to WTERT 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. WTERT will confirm reservation by e-mail. Bus will leave at 9:30 AM from in front of Schapiro Hall (520 West 120th Street) and return to the same location. Casual attire is recommended and shorts and open-toed shoes should not be worn.

FOR MORE INFORMATION ON WTERT 2008 MEETING, PLEASE CONTACT MR. S.H. LEE, WTERT COUNCIL, SL2304@COLUMBIA.EDU; TEL: 1-212-854-9136; FAX: 1-212-854-7081

Directions to the 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.

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

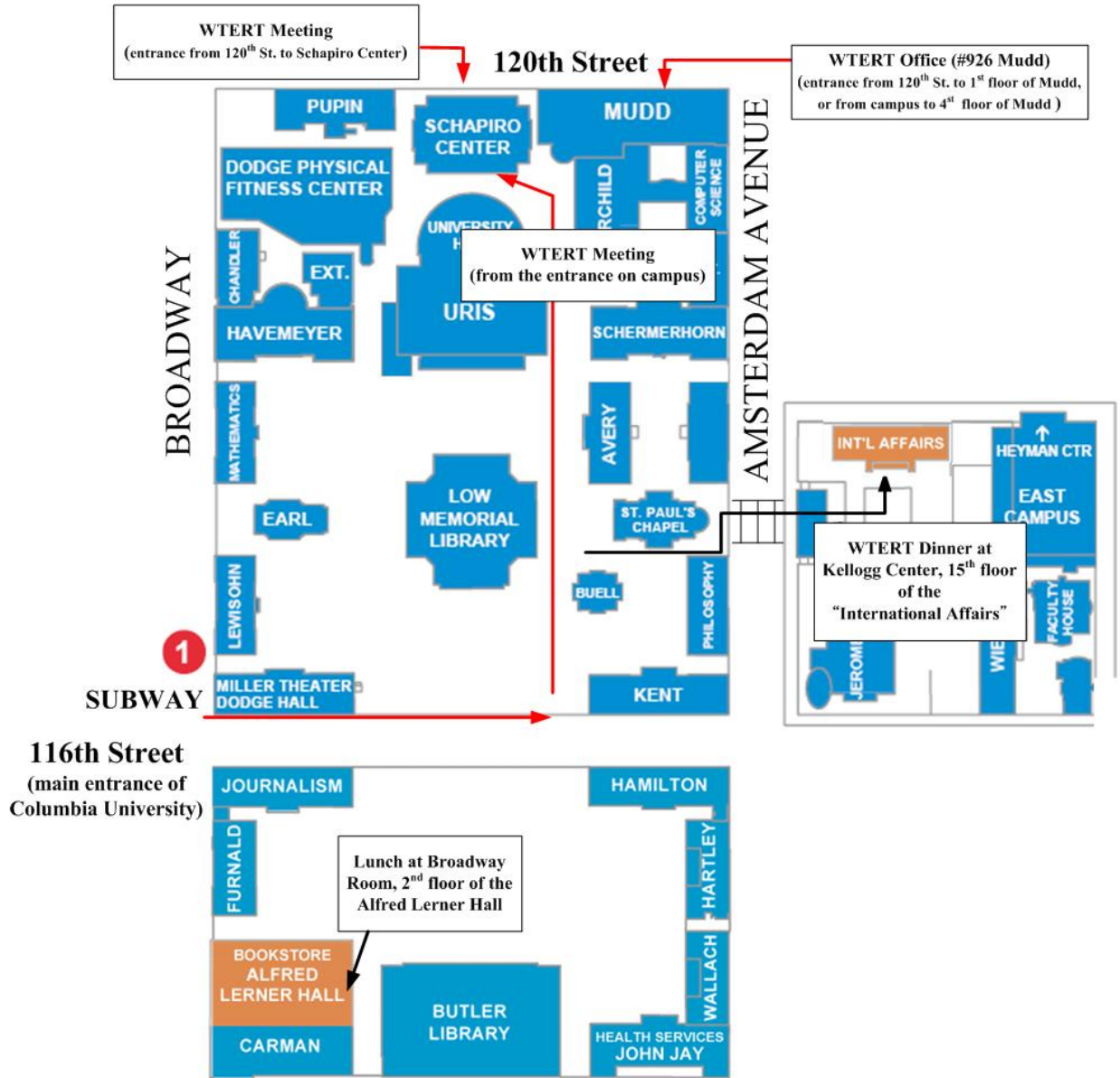
- Riverside Church 120th St. between Riverside Drive & Claremont Avenue (212) 870-6736
- Hospital Parking 114th St. between Broadway & Amsterdam Avenue (212) 523-1051
- GGMC 122th St. between Broadway & Amsterdam Avenue (212) 865-1754
- Morningside Garage Broadway at 124th Street (212) 864-9877
- Park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

Accommodation in New York City

Special rates for the preferred local NYC hotels listed below. These rates are available to all Columbia University faculty and staff and their guests. When making reservations please specify that you are calling from Columbia University and use the Columbia Reference listed. Please note that the listed rates do not include taxes (e.g., state, city and occupancy tax) and may not always be available.

Name and Address	Reservations Number	Columbia Reference	Columbia Rate	Additional information
Flatotel 135 West 52nd Street New York, NY	800-352-8683	Request the Columbia University rate	Sept 3 – Dec 31: \$295	Additional rates available; please contact the hotel.
Hotel Beacon 2130 West 75th Street New York, NY	212-787-1100 x623 or reservations@beaconhotels.com	Request the Columbia University rate	Sept 1 – Dec 31: \$225	Additional rates available; please contact the hotel.
Hotel Belleclaire 250 West 77th Street New York, NY	212-362-7700 or 877-468-5322	Request the Columbia University rate	Sept 1 – Dec 31: \$239	
Hotel Newton 2528 West 96th Street New York, NY	212-678-6500 or 800-643-5553	Request the Columbia University rate	Sept 1 – Dec 29: \$185	
Hudson Hotel 356 West 58th Street New York, NY	800-444-4786	Request the Columbia University rate	Sept 3 – Dec 31: \$309	Additional rates available; please contact the hotel.
On The Ave 2178 West 77th Street New York, NY	212-362-1100 or 800-497-6028	Request the Columbia University rate	Sept 2 – Dec 31: \$349	
The Lucerne West 79th Street & Amsterdam Ave. New York, NY	212-875-1000 x80 or 800-492-8122	ID: 119	Sept 1–Dec 31: \$215	Additional rates available; please contact the hotel.
The Travel Inn Hotel 515 West 42nd Street New York, NY	212-695-7171 or 800-869-4630	Request the Columbia University rate	Sept 1 – Dec 29: \$225	

Map of Columbia Morningside Campus



Lunch at Broadway Room, 2nd floor of Alfred Lerner Hall



Dinner at Kellogg Center, 15th floor of International Affairs Building

