

**URBAN INFRASTRUCTURES: ANALYSIS AND MODELING**

 **FOR THEIR OPTIMAL MANAGEMENT AND OPERATION**

NSF Workshop

November 30 – Dec. 1st, 2017

New York Institute of Technology

16 West 61st Street, 11th floor Auditorium

New York City, NY 10023

The workshop will examine infrastructure systems in paradigmatic urban eco-districts, (e.g. CBD, residential, manufacturing). We will envision a sustainable and resilient city through the prism of interrelated Food, Energy, Water (FEW) infrastructures.

Participants will consider how strategies and illustrative tactics can be developed applicable to different scenarios and involving decision stakeholders. We will discuss predictive models and tools developed from various urban datasets that may be leveraged for scenario analysis and for envisioning high performance infrastructure systems, at district or city scales. These scenarios will be illustrated and diagrammed to facilitate engagement of the stakeholders.

**Organizing Committee:**

Nada Anid, NYIT; Michael Bobker, CUNY, Ziqian Dong, NYIT; Ursula Eicker, HFT Stuttgart; Masoud Ghandehari, NYU; Marta Panero, NYIT; Jeffrey Raven, NYIT; Roberto Rojas-Cessa, NJIT; and Joshua Sperling, NREL.

 **AGENDA**

Each session will feature three or four selected speakers who will present first, followed by at least 45 minutes allocated for open discussion.

Day 1: November 30, 2017 (2:00 – 5:45pm)

**Welcome and Workshop Goals** (2:00 – 2:15pm)

Nada Marie Anid, Ph.D., Dean, School of Engineering and Computing Sciences, NYIT

**Session 1: Systems-Based Approaches** (2:15 – 3:30pm)

This session will focus on systems-based and holistic approaches that provide pathways for the optimal management of urban critical infrastructure (ICI) systems for FEW supply. These approaches lead to fundamental understanding of interdependencies between urban infrastructure systems and help develop deeper understanding of the function and interaction of urban food distribution, water, waste and energy, within cities subject to increased demands and under extreme conditions.

Moderator: Marta Panero, Ph.D., Director, Strategic Partnerships, SoECS, NYIT

Speakers:

Ming Xu, Ph.D., Associate Professor, and Director of China Programs, School of

 Environment & Sustainability, University of Michigan, Ann Arbor, MI

Hillary Brown, FAIA, Professor, and Director, MS Program in Sustainability in the Urban Environment, Bernard and Anne Spitzer Sch. of Architecture, City College of New York, CUNY

Osvaldo A. Broesicke, E.I.T, Graduate Research Associate, Brook Byers Institute for

 Sustainable Systems, Georgia Institute of Technology

Respondent: Josh Sperling, Ph.D., Researcher, Urban Futures & Energy-X Nexus, National

 Renewable Energy Lab

**Break** (3:30 – 3:45pm)

**Session 2: End-User Perspective: What Stakeholders Want to See** (3:45–5:15 pm)

This session will focus on approaches and participatory models to co-produce knowledge on the key features and variability of urban critical infrastructure systems. Optimization of regional and local food-energy-water systems that take into account their inter-dependencies may be accomplished via integration based on co-decision, which aim to simultaneously optimize multiple, interconnected systems. This session includes discussion on tools to support stakeholders in visualizing and understanding the complex interdependencies and potential for synergistic co-benefits and coordinated decisions supporting integrated infrastructure systems.

Moderator: Michael Bobker, Associate Director, CUNY Institute for Urban Systems, and

 Director, Building Performance Lab, CUNY

Speakers:

Newsha Ajami, Ph.D., Director, Urban Water Policy, Senior Research Associate, Stanford Woods Institute for the Environment

John L. Lee, Deputy Director, Mayor’s Office of Sustainability, New York City Government

Jason Bregman, Associate, Environmental Planning and Design, Michael Singer Studio

Respondent: Dalia Patino-Echeverri, Ph.D., Gendell Family Associate Professor,

 Environmental Sciences and Policy, DIBS, Duke University

**Networking Reception** (5:15pm– 6:00pm)

Day 2: December 1, 2017 (8:00am – 4:30pm)

Breakfast (8:00am– 8:30pm)

**Session 3. Models and Tools for Understanding the Evolution of Cities and Infrastructures** (8:30 -10 am)

Presenters will review and lead discussion of modeling frameworks for the simulation of impacts of land use, climate change and decentralization of critical (FEW) supply infrastructure in cities in order to ensure adequate energy, water and food distribution and storage.

Moderator: Ziqian (Cecilia) Dong, Ph.D., Associate Professor, Electrical & Computer

 Engineering, School of Engineering & Computing Sciences, NYIT

Speakers:

Yimin Zhu, Ph.D., Professor, Pulte Homes Endowed Professor, Bert S. Turner Dept. of

 Construction Management, College of Engineering, Louisiana State University

Vatsal Bhatt, Ph.D., Senior Energy Policy Advisor, Brookhaven National Laboratory

Ali Mostafavi, Assistant Professor, Texas A&M

Respondent: Jeffrey Raven, FAIA, LEED BD+C, Associate Professor, Director of Graduate

 Program in Urban & Regional Design, School of Architecture and Design, NYIT

**Break** (10:00 am- 10:15 am)

**Session 4.a: Case Studies I: System Integration** **– Food & Water** (10:15 -11:45am)

Participants will discuss potential case studies related to food and water in New York City and Germany, to help identify key research questions, best management practices and best points for optimal supply of resources within city boundaries emphasizing interventions that increase infrastructure linkages and close resource loops. Case studies include: a) Urban agriculture; b) Food Distribution Networks; c) Wastewater treatment facilities including at the district level; and d) Constructed wetlands.

Moderator: David Nadler, Ph.D., Associate Professor and Chair, Environmental Technology and Sustainability, School of Engineering & Computing Sciences, NYIT

Speakers:

Weslynne S. Ashton, Ph.D., Associate Professor, of Environmental Management and

 Sustainability, Stuart School of Business, Illinois Institute of Technology

Adam Hinge, President, Sustainable Energy Partnerships, and Adj. Prof., Columbia

 University

Alfred Helble, AH Consultant, CITYtrans, Stuttgart, Germany

William (Bill) Solecki, Professor, Graduate Geography Advisor, and Founder

 Director, Emeritus, CUNY Institute for Sustainable Cities, CUNY

Respondent: Carli FLynn, Ph.D., Postdoctoral Fellow, Golisano Institute for Sustainability,

 Rochester Institute of Technology

**Lunch** (11:45am – 12:30pm)

**Session 4b: Case Studies: Urban Districts - Energy** (12:30 – 2:00 pm)

This session will focus on outlining the research agenda pathways for cities to strengthen energy usage and generation at the district level. Case studies will focus on microgrids, digital grids and urban energy models.

Moderator: Ursula Eicker, Professor, University of Applied Sciences, HTF, Stuttgart, Germany

Speakers:

Roberto Rojas-Cessa, Ph.D., Professor, Electrical and Computer Engineering, Newark

 College of Engineering, New Jersey Institute of Technology

Ahmed Mohammed, Ph.D., Assistant Professor, Electrical Engineering, Grove School

 of Engineering, City College of New York, CUNY

Yixing Chen, Ph.D., Senior Scientific Engineering Associate, Lawrence Berkeley

 National Lab

Respondent: Michael Bobker, CIUS and BPL, City College of NY, CUNY

**Networking Break** (2:00 – 2:15pm)

**Session 5: City Data and Urban Informatics** (2:15 – 3:45 pm)

This session will focus on approaches for data collection (including sensor systems), correlation and analysis of urban data, data sources, repository structures and application work flows. The discussion will attempt to understand the best approaches for the integration of heterogeneous data (including from sensor systems) into models for real-time analytics and scenario exploration, as well as for monitoring and forecasting.

Moderator: Roberto Rojas-Cessa, Professor, Newark School of Engineering, New Jersey

 Institute of Technology

Speakers:

Ziqian (Cecilia) Dong, Ph.D., Associate Professor, Electrical & Computer Engineering,

 School of Engineering & Computing Sciences, NYIT

Ursula Eicker, Professor, University of Applied Sciences, HTF, Stuttgart, Germany

Michael Flaxman, Founder and CEO, Geodesign Technologies

Andrew Parker, Researcher III, Mechanical Engineering, National Renewable Energy Lab

Masoud, Ghandehari, Ph.D., Associate Professor, Civil and Urban Engineering; Center

 for Urban Science and Progress, Tandon School of Engineering, New York University

Respondent: Brunilde Sansò, Ph.D., Professor, Telecommunication Networks, Dept. of

 Electrical Engineering, École Polytechnique, Montréal.

**Networking Break** (3:45 – 4:00pm)

**Session 6: Workshop Wrap-up: Research Agenda, Opportunities and Next Steps.**

(4:00 – 5:15pm)

During the final session of the workshop, participants will be engaged to elaborate a shared research agenda that supports active engagement and joint approaches to the optimal management of interrelated critical infrastructural system in urban centers. We will review funding opportunities, opportunities for working with municipalities and projects in-development, plans for obtaining data for further research and/or case studies, and taking next steps for engaging stakeholders.

Chair: Nada Marie Anid, Ph.D., Dean, SoECS, NYIT

Next Steps and Opportunities.

**Meeting adjourned** (5:15pm)

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