

Food-Energy-Water Nexus 2019

New York, New York, USA
5 – 6 December 2019

ISBN: 978-1-7138-0579-3

-Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2019) by AIChE
All rights reserved.

Printed with permission by Curran Associates, Inc. (2021)

For permission requests, please contact AIChE
at the address below.

AIChE
120 Wall Street, FL 23
New York, NY 10005-4020

Phone: (800) 242-4363
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

THURSDAY INVITED TALKS

| | |
|--|-----|
| OPENING TALK..... | N/A |
| <i>Babak D. Beheshti</i> | |
| PLENARY TALK: ONENYC 2050 | 1 |
| <i>John Lee</i> | |
| INVITED TALK: CATALYZING COMMERCIALIZATION & SOCIETAL IMPACT AT NSF..... | 2 |
| <i>Rajesh Mehta</i> | |
| KEYNOTE TALK: RESPONDING TO THE FOOD-ENERGY-WATER NEXUS CHALLENGE..... | 3 |
| <i>Dale Keairns</i> | |
| KEYNOTE TALK: FOOD-ENERGY-WATER AND WASTE NEXUS IN ACHIEVING SUSTAINABLE CIRCULAR URBANDEVELOPMENT (SCUD) | 4 |
| <i>Serpil Guran</i> | |

PANEL 1: CITY-AS-LAB INFEW RCN: RESEARCH GAPS, CURRENT MODELS AND TOOLS AVAILABLE FOR THE STAKEHOLDERS

| | |
|--|----|
| PANEL TALK: BUILDING TRANSDISCIPLINARY, MULTI-STAKEHOLDER PARTNERSHIPS TO FACILITATE TRANSITIONS TO EQUITABLE AND SUSTAINABLE URBAN FOOD SYSTEMS | 5 |
| <i>Weslynne Ashton</i> | |
| PANEL TALK: THE VIRTUAL INFORMATION FABRIC INFRASTRUCTURE (VIFI): APPLICATION CASES FOR BUILDING PERFORMANCE SIMULATIONS | 6 |
| <i>Yimin Zhu</i> | |
| PANEL TALK: EVALUATING THE FOOD-ENERGY-WATER NEXUS IN AN URBAN DISTRICT | 7 |
| <i>Ursula Eicker, Juergen Schumacher, Reiner Braun, Masoud Ghandehari</i> | |
| PANEL TALK: LESSONS LEARNED: CREATING AN INTERDISCIPLINARY TEAM TO ADDRESS A FEW NEXUS HOTSPOT IN SAN ANTONIO, TEXAS | 8 |
| <i>Bassel Daher</i> | |
| PANEL TALK: NATURAL LANGUAGE PROCESSING AND SPATIOTEMPORAL VISUALIZATION FOR WILDFIRE EVENT RECONSTRUCTION..... | 9 |
| <i>Michael Flaxman</i> | |
| ON THE ROLE OF ENERGY STORAGE IN FUTURE ENERGY NETWORKS..... | 10 |
| <i>Ahmed Mohamed</i> | |

LIGHTNING ROUND 1

| | |
|--|----|
| A STUDY ON FOOD, ENERGY, AND WATER IMPACTS OF THE AVERAGE AMERICAN DIET BY DEMOGRAPHIC GROUP..... | 11 |
| <i>Joe Bozeman</i> | |

| | |
|---|-----|
| IS ORGANIC STILL SUSTAINABLE? AN INVESTIGATION OF CONSUMER PERCEPTIONS OF FOOD PRODUCTION SUSTAINABILITY..... | 12 |
| <i>Veneta Sotiropoulos, Catherine Cho, Samuel Chen, Joel Dasilva, Jonathan Flores</i> | |
| A CASE STUDY OF DIETARY PATTERN CHANGE IMPACT ON CARBON FOOTPRINT..... | 13 |
| <i>Raghul Elangovan, Ziqian (Cecilia) Dong</i> | |
| LAND USE ANALYSIS OF FOOD PRODUCTION POTENTIALS TO FEED A GROWING POPULATION..... | N/A |
| <i>Jatin Jain, Ziqian (Cecilia) Dong</i> | |
| UTILIZING URBAN ORGANIC WASTES VIA HYDROTHERMAL CARBONIZATION PROCESS FOR ENERGY PRODUCTION | 14 |
| <i>Justinus A. Satrio, Ross Lee, Jeremy Taylor, Dan Spracklin</i> | |
| MACHINE LEARNING APPROACH TO EXAMINE THE RELATIONSHIP BETWEEN RESIDENTIAL ENERGY AND WATER CONSUMPTION WITH GREENHOUSE GAS EMISSIONS IN NYC | 15 |
| <i>Stephan Brown, Mohammad Baidas, Ziqian (Cecilia) Dong</i> | |
| SIMULTANEOUS AMMONIA-PHOSPHATE RECOVERY FROM WASTEWATER AS STRUVITE FERTILIZER FOR FOOD QUALITY | 16 |
| <i>Lucy Mar Camacho, Md Ahsan Ullah</i> | |
| CO2-RESPONSIVE TUNABLE PHASE CHANGING NANO-SCALE FLUIDS FOR SUBSURFACE ENERGY RECOVERY | 17 |
| <i>Greeshma Gadikota, Hassnain Asgar, Erin Huang</i> | |
| UPCOMING SCENARIOS AND DEVELOPING TRENDS IN THE GENERATION OF ENERGY IN PAKISTAN: FORECASTING SUPPLY AND DEMAND..... | 18 |
| <i>Usman Farooq, Muhammad Danish, Sajjad Ahmad, Syed Waqas Ahmad</i> | |

PLENARY TALK II

| | |
|---|----|
| PLENARY TALK: A GLOBAL CRISIS - BEYOND THE BRINK..... | 19 |
| <i>James Thebaut</i> | |

SESSION 1: FEW CASE STUDY AND DECISION MAKING TOOLS

| | |
|--|----|
| KEYNOTE TALK: BIOENERGY WITH CARBON CAPTURE AND STORAGE (BECCS): H2 PRODUCTION FROM FOOD WASTES WITH SUPPRESSED COX FORMATION..... | 20 |
| <i>Ah-Hyung Alissa Park</i> | |
| HOW 50 FOOD & BEVERAGE MANUFACTURING FACILITIES IMPROVED PROFITABILITY BY REDUCING FOOD LOSS..... | 21 |
| <i>Bruce Taylor</i> | |
| TOWARD CREATING AN ENVIRONMENT OF COOPERATION BETWEEN WATER, ENERGY, AND FOOD STAKEHOLDERS IN SAN ANTONIO | 22 |
| <i>Bassel Daher, Rabi Mohtar, Kent Portney, Bryce Hannibal</i> | |
| INTEGRATED MODELING OF FOOD-ENERGY-WATER SYSTEMS: CHALLENGES AND OPPORTUNITIES OF QUANTITATIVE GRAPHICAL NETWORKS..... | 23 |
| <i>Ryan S. D. Calder, Marc Jeuland, Mark E. Borsuk, Lydia P. Olander, Kyle Bradbury, Jordan M. Malof</i> | |

| | |
|---|----|
| INVESTIGATING THE FOOD-ENERGY-WATER NEXUS THROUGH EMBEDDED RESOURCE ACCOUNTING..... | 24 |
| <i>Tasnuva Mahjabin, Caitlin Grady</i> | |
| WRF'S TRANSITION FROM WATER-ENERGY NEXUS TO THE FOOD-ENERGY-WATER NEXUS..... | 25 |
| <i>Ashwin Dhanasekar</i> | |
| THE INTERSECTION OF URBAN AND RURAL COMMUNITIES: BUILDING RESILIENCE THROUGH THE FOOD ENERGY WATER NEXUS..... | 26 |
| <i>Jennifer Daw, Sherry Stout</i> | |

SESSION 2: FOOD WASTE

| | |
|---|----|
| KEYNOTE TALK: FOOD WASTE AS A SUSTAINABLE RESOURCE FOR THE PRODUCTION OF CARBONS FOR PURIFICATION AND CATALYTIC PROCESSES | 27 |
| <i>Julia A. Valla, Lei Yu, David P. Gamliel, Brianna Markunas, Katherine M. Saltzgeber</i> | |
| TOPIC: FOOD WASTE IN K-12 SCHOOLS TITLE: FOOD WASTE PREVENTION AND REDUCTION PILOT IN BALTIMORE CITY SCHOOLS: FOOD MATTERS - FOR STUDENTS, FACULTY AND STAFF..... | 28 |
| <i>Ava Richardson</i> | |
| FOOD, ENERGY & WATER: THE IMPACT OF A FOOD WASTE REDUCTION TRAINING PROGRAM FOR FOOD SERVICE WORKERS IN AN URBAN SCHOOL DISTRICT | 29 |
| <i>Sara Elnakib, Amy Rowe</i> | |
| FOCUS ON FOOD, FARMING AND CLIMATE CHANGE | 30 |
| <i>Jack Starr</i> | |

LIGHTNING ROUND 2

| | |
|--|----|
| THE IMPACT OF THE LOCALLY-SOURCED FOOD VERSUS THE MASS-PRODUCED FOOD ON CONSUMER PERCEPTIONS OF FARM-TO-TABLE AND CARBON FOOTPRINT | 31 |
| <i>Zhinan Li, Nianxi Li, Linhan Su, Shiyao Wei, Veneta Sotiropoulos</i> | |
| FROM NATIONAL INDICES TO REGIONAL ACTION-AN ANALYSIS OF FOOD, ENERGY, WATER SECURITY IN ECUADOR, BOLIVIA, AND PERU | 32 |
| <i>Paniz Mohammadpour, Caitlin Grady</i> | |
| TREATING WASTE WITH WASTE: USING BIOCHAR TO RECOVER NUTRIENTS FROM AD EFFLUENT | 33 |
| <i>Diana Rodriguez Alberto, Thomas Trabold</i> | |
| TO MEAT OR TO PLANT-BASED MEAT: THE IMPACT OF CONSUMER RESISTANCE OF SUBSTITUTE ANIMAL-BASED MEAT WITH PLANT-BASED MEAT | 34 |
| <i>Wenxiang Wu, Xinpeng Lu, Zhaoshu Meng, Leany Rodriguez, Veneta Sotiropoulos</i> | |
| IMPACT OF ELECTRIFYING URBAN FOOD DELIVERY TRUCKS ON THE ENVIRONMENT AND THE POWER GRID..... | 35 |
| <i>Raghul Elangovan, Jatin Jain, Ziqian (Cecilia) Dong, Ahmed Mohamed, Yusef Esa, Lizzette Salmeron</i> | |

| | |
|---|----|
| FOOD WASTE TO ENERGY: LEVERAGING CATALYTIC HYDROTHERMAL LIQUEFACTION..... | 36 |
| <i>Heather O. Leclerc, Michael T. Timko, Andrew Teixeira, Geoffrey Tompsett</i> | |

SESSION 3: BIOGAS AND INFRASTRUCTURE

| | |
|--|----|
| INVITED TALK: DESIGNING MULTIFUNCTIONAL PROCESSES TO DIRECT THE SYNTHESIS OF CLEAN ENERGY CARRIERS WITH INHERENT CO ₂ CAPTURE AND CONVERSION FROM HETEROGENEOUS CARBONACEOUS FEEDSTOCKS | 37 |
| <i>Greeshma Gadikota, Tianhe Yin, Xun Gao</i> | |

| | |
|---|----|
| ANAEROBIC WASTEWATER AND ENVIRONMENTAL MICROBIAL COMMUNITIES READILY DEMETHYLATE METHOXY AROMATIC PPCPS | 38 |
| <i>Sarah J Wolfson, Abigail W Porter, Lily Y Young</i> | |

| | |
|---|----|
| TRANSFORMING RURAL COMMUNITY ECONOMY FROM LINEAR TO CIRCULAR ONE USING BIOGAS PRODUCTION TECHNOLOGY | 39 |
| <i>Abiodun S. Momodu, Tofunmi D. Adepoju</i> | |

| | |
|---|----|
| AN ANALYTICAL FRAMEWORK FOR ASSESSING BIOGAS POTENTIAL FROM CONSUMER FOOD WASTE IN US CITIES..... | 40 |
| <i>Emily A. Beagle, Yael R. Glazer, Michael E. Webber</i> | |

| | |
|---|----|
| INFRASTRUCTURE EXPANSION PLANNING UNDER FOOD-ENERGY-WATER NEXUS CONSIDERATIONS | 41 |
| <i>Styliani Avraamidou, R. Cory Allen, Efstratios N. Pistikopoulos, Bassel Daher, Marcello Di Martino, Julie Cook</i> | |

| | |
|---|----|
| TRANSFORMING WASTEWATER SYSTEMS AS COMMUNITY RESOURCE | 42 |
| <i>Sherry Stout, Jennifer Daw</i> | |

| | |
|--|----|
| EMPLOYING DECISION ANALYSIS TO EVALUATE NONTRADITIONAL MANAGEMENT PATHWAYS FOR PRODUCED WATER FROM OIL AND GAS EXTRACTION..... | 43 |
| <i>Michael E. Webber, Emily A. Beagle, Yael R. Glazer</i> | |

POSTER SESSION

| | |
|--|----|
| "CHROMASH": ADSORPING CHALLENGES, DESORPING SUSTAINABILITY | 44 |
| <i>Muhanad Omar, Batoul Osman, Amel Osama, A. Shakoor Awad</i> | |

| | |
|---|----|
| ALTERNATIVE APPROACH TO THE DESIGN OF TOILETS FOR OPTIMAL WATER CONSUMPTION | 45 |
| <i>Ciny Natalia Peraranda Palacios, Laura Daniela Pinzin Bustamante</i> | |

| | |
|---|----|
| AN ANALYSIS OF THE POSSIBLE FINANCIAL SAVINGS OF A CARBON CAPTURE PROCESS THROUGH CARBON DIOXIDE ABSORPTION AND GEOLOGICAL DUMPING..... | 46 |
| <i>Ronald Ssebadduka</i> | |

| | |
|---|----|
| CARBON CAPTURE USING INDUSTRIAL HYDROXIDES FOR EOR- OPPORTUNITIES,CHALLENGES AND THE WAY AHEAD..... | 47 |
| <i>Nehil Shreyash</i> | |

| | |
|--|----|
| CARBON DIOXIDE SOLUBILITIES IN DECANOIC ACID-BASED HYDROPHOBICDEEP EUTECTIC SOLVENTS | 48 |
| <i>Vishwas Gupta</i> | |

| | |
|--|----|
| CHINESE FOOD IN CHINA VS. CHINESE FOOD IN AMERICA: CHINESE AND AMERICAN PERCEPTIONS OF HEALTHINESS | 49 |
| <i>Veneta Sotiropoulos, Yuheng Cai</i> | |
| DO AMERICANS HAVE A MISGUIDED INTERPRETATION OF AMERICAN RAISED FOOD | 50 |
| <i>Andrew Chery, Nkulu Mkhonto, Sergio Fernandez, Veneta Sotiropoulos</i> | |
| FOOD WASTE SEPARATION & DEPACKAGING: CAPTURING ORGANIC RESIDUALS FOR NUTRIENT REPURPOSING, COMPOST AND/OR RENEWABLE ENERGY | 51 |
| <i>Corey Rossen</i> | |
| GIS-BASED ASSESSMENT OF REGIONAL BIOMASS POTENTIALS FOR HEAT AND POWER GENERATION AT THE EXAMPLE OF LUDWIGSBURG COUNTY, GERMANY | 52 |
| <i>Rushikesh Padsala, Keyu Bao, Chris Kesnar, Volker Coors, Bastian Schrater</i> | |
| MEAL-KIT DELIVERY: THE TRADE-OFFS OF FOOD WASTE AND ENERGY CONSUMPTION | 53 |
| <i>Todd Davidson, Michael Webber, Isabella Gee, Brittany Speetles</i> | |
| MITIGATING POLYMER ABSORPTION IN POROUS SILICA FORMATIONS WITH SURFACTANTS & SILICANANOFLUIDS: A VISCOSITY, TEMPERATURE AND RHEOLOGY STUDY INVESTIGATION | 54 |
| <i>Saurabh Kr Tiwary</i> | |
| OPTIMAL ALLOCATION OF RENEWABLE ENERGY GENERATION AND STORAGE SYSTEMS | 55 |
| <i>Julie Cook, Styliani Avraamidou, R. Cory Allen, Efstratios N. Pistikopoulos</i> | |
| SOFT COMPUTING TOOL FOR AIDING THE INTEGRATION OF RENEWABLE ENERGY SYSTEMS IN ISOLATED AREAS OF COLOMBIA | 56 |
| <i>Ana M Rosso-Ceron, Viatcheslav Kafarov</i> | |
| UNDERSTANDING AND CONCEPTUALIZING HOW URBAN GREEN BLUE INFRASTRUCTURE AFFECTS THE FOOD, WATER, AND ENERGY NEXUS: A SYNTHESIS OF THE LITERATURE | 57 |
| <i>Fanxin Meng</i> | |
| UTILIZING NOVEL TECHNOLOGIES FOR EXTRACTION OF BIOACTIVE COMPOUNDS FROM MANDARINE JUICE PRODUCTION WASTE | 58 |
| <i>Sven Karlovi, Tomislav Bosiljkov, Filip Dujmi, Mladen Bri, Marko Marelja, Marko Rkegro, Damir Jeek</i> | |

Author Index