AIChE Midwest Regional Conference

UIC- Chicago, IL

November 10-11, 2011

Conference Sponsors

We would like to thank our 2011 AIChE Midwest Regional Conference Sponsors. This conference would not be possible without their support.

middough®

NALCO

bp

CITGO

ISER
WANGER INSTITUTE FOR SUSTAINABLE ENERGY RESEARCH
AT ILLINOIS INSTITUTE OF TECHNOLOGY

Ambitech

BAKERRISK

C C C
Chicago Chem Consultants

ExxonMobil

PSRI
Particulate Solid Research, Inc.

Conference Sponsors

We would like to thank our 2011 AIChE Midwest Regional Conference Sponsors. This conference would not be possible without their support.

Sargent & Lundy LLC

UIC University of Illinois at Chicago Women in Science and Engineering
CENTER FOR RESEARCH ON WOMEN AND GENDER

SimuTech Group.com

ALFA LAVAL

High School Outreach Program Sponsors

We would like to thank our 2011 AIChE Midwest Regional Conference High School Outreach Sponsors.

bp

Ambitech

Table of Contents

Introduction

In its 4th consecutive year, the AIChE Midwest Regional Conference continues to thrive and provides an excellent opportunity for professionals to expand their technical knowledge as well as to network with other colleagues. By way of the Chicago Local Section, AIChE headquarters, and the University of Illinois at Chicago, the main theme of this year's conference is "Energy is Everything". The goal of the sessions is to highlight how the various topics relate to Energy. The sessions are focused first on what is happening now with take-home examples as well as a look over the horizon at oncoming process energy developments.

Conference highlights include:

- Thursday Keynote Speaker: **Mr. Nick Spencer, Business Unit Leader of the BP Whiting Refinery and Modernization Project**, will speak about the rich history of this massive refinery in Whiting, Indiana. He'll then focus on the reasons for the modernization project and what is being built to sustain the Refinery for the future.

- Thursday Evening **Poster Session**: features Midwest universities presenting their Research with an emphasis on Energy Relevance.

- Thursday Evening **Chicago Local Section Dinner**: features 2011 Thiele Award Presentation to Dr. Urmila Diwekar. The main speaker is **Martin Linck, Principal Engineer from GTI,** talking about the Production of Gasoline and Diesel from Biomass through Integrated Hydropyrolysis and Hydroconversion (IH2).

- Friday Keynote Speaker: **Dr. Narasimha Rao, Nalco Division Vice President of R & D, Innovation Marketing,** will talk about Improving Energy Efficiency in Industrial Use: Why Water Matters.

The Chicago Local Section, along with the University of Illinois at Chicago is pleased to continue the tradition of sponsoring the **Pre-College Student Outreach Program**. The program allows Chicago-area students to become acquainted with the various facets of the chemical engineering profession. The program will take place on both days and the featured speaker is **Dr. Al Sacco, Dean of the College of Engineering at Texas Tech University and former NASA payload specialist**. The program also includes a luncheon where students can interact with professionals.

For young professional engineers, there will be a number of workshops held on both days to help fine-tune interviewing skills, improve the effectiveness of resumes, learn about retirement planning and allow for social networking opportunities.

This conference would not be possible without the support of our corporate sponsors. A list of these sponsors can be found within the program book, as well as our website, http://midwestregional.aiche.org.

Program Grid: Special Events

Time	Description	Location
Thursday 8:15 – 9:30 AM	**Thursday Keynote Address**	Tower Room 605
	BP Whiting Refinery and Modernization Project **Nick Spencer,** BP Whiting Refinery Business Unit Leader	
Thursday 9 AM – 2 PM	**Student Outreach Program** (See page 15 for more information)	Illinois Room A/B
Thursday 4:30 – 6:30 PM	**Poster Session**	Fort Dearborn A/B
	Midwest Schools will present their Research with an emphasis on Energy Relevance	
Thursday 6:30 – 9:00 PM	**Chicago Local Section Dinner**	Cardinal Room
	Dinner with fellow colleagues and the presentation of 2011 Thiele Award to Dr. Urmila Diwekar. The featured talk of the dinner is **The Production of Gasoline and Diesel from Biomass through Integrated Hydropyrolysis and Hydroconversion (IH2) , Martin Linck,** Principal Engineer, GTI	
Friday 8:20 – 9:30 AM	**Friday Keynote Address**	Tower Room 605
	Improving Energy Efficiency in Industrial Use: Why Water Matters **Narasimha Rao,** Nalco Division Vice President of R&D, Innovation Marketing	
Friday 9 AM – 2 PM	**Student Outreach Program** (See page 15 for more information)	Illinois Room A/B

Young Professional Advisory Board Program Grid – Thursday, November 10, 2011

Time	Description	Location
Thursday 1:00 – 1:45 PM	**Investing in Your 20s**	White Oak A/B
	The goal of the discussion will be to give younger professionals a better understanding of how to make wise financial decisions.	
Thursday 1:45 – 2:30 PM	**Mathematical Modeling of An F1 Style Engine - Predicting the Torque Curves of New Engines**	White Oak A/B
	Discussion of engine simulation in the research and development of new engine platforms and how they can be constructed to predict what will hopefully power a very competitive 2014 F1 season.	
Thursday 3:00 – 4:30 PM	**Panel Discussion - Post Degrees for Chemical Engineers**	White Oak A/B
	A panel discussion on degree and certification opportunities available to Chemical Engineers following undergraduate.	

Young Professional Advisory Board Program Grid – Friday, November 11, 2011

Time	Description	Location
Friday 1:00 – 1:45 PM	**Technical Writing for Engineers**	White Oak A/B
	This session will provide a review of the methodologies and practice behind strong technical writing. Topics will include writing, drafting, revising and finishing as well as the elements of style; structure, language, and illustration.	
Friday 1:45 – 2:30 PM	**Increasing Your Odds - A Perspective on a More Successful Job Search**	White Oak A/B
	The presentation will focus on exploiting all the tools available to find these opportunities, making the cut with an effective resume, then acing the interview.	
Friday 3:00 – 4:30 PM	**Résumé Workshop and Mock Interviews**	White Oak A/B
	One-on-one résumé critiques and mock interviews directed by Chicago Young Professionals.	
Friday 6 – 9 PM	**Networking Event**	Morgan's Bar & Grill 1325 S. Halsted St. Chicago, IL
	A free networking event for Young Professionals. Soft drinks and appetizers courtesy of AIChE-Chicago.	

Program Grid: Technical Sessions - Thursday, November 10, 2011

Welcoming Remarks and Keynote Presentation		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
8:15 – 8:20 AM	Welcoming Remarks	, Dean of College of Engineering at the University of Illinois at Chicago.
8:20 – 8:25 AM	Introduction to Keynote Speaker	Jeffery Perl, CCC, Programming Chair
8:25 – 9:25 AM	Keynote – BP Whiting Refinery and Modernization Project	mailto:Bill.Hoback@illinois.govNick Spencer, Business Unit Leader of the BP Whiting Refinery

Energy Success Stories		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
9:30 – 9:55 AM	Energy Reduction in An Ethanol Distillation – A Simulations Case Study	Jose Leboreiro, Archer Daniels Midland
10:00 – 10:25 AM	Waste Management - Landfill Gas Renewable Energy	Bill Gamlin and Rod Stipe, Waste Management Inc.
10:30 – 10:55 AM	Geothermal and Co-Generation At UIC	Dr. Sohail Murad, Chemical Engineering, University of Illinois at Chicago
11:00 – 11:55 AM	Tour of Geothermal Plant	

Program Grid: Technical Sessions - Thursday, November 10, 2011

Back to Basics – Part I		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	Should I Use Steam or Electric for My Heat Management System	Paula Peterson and Jim Dennington, Tyco Thermal Controls
1:30 – 1:55 PM	Centrifugal Pumps 101	Billy Stout, Clyde Union Pumps
2:00 – 2:25 PM	Optimal Evaporator Design	Ralph Scully, InCon Technologies

Refining Energy Updates		Location: Tower Rm 613
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	CITGO – Lemont Refinery Energy Projects	Aaron Wright, Envoy Development
1:30 – 1:55 PM	Enhanced Testing Capability for Asphaltene Stability Prediction and Crude Compatibility	Sai Reddy Pinappu and Corina L Sandu, Baker Hughes
2:00 – 2:25 PM	Refinery Combined Heat & Power (CHP) with Spinning Reserve (SR): Profitably Reduce Green House Gases	Suresh Jambunathan, Recycled Energy Development, LLC

Program Grid: Technical Sessions - Thursday, November 10, 2011

University Process Research - I		Location: Tower Rm 603
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	Role of University Startup Companies in Technology Commercialization	Robert F. Anderson, Corporate Relations, Illinois Institute of Technology
1:30 – 1:55 PM	Role of University Startup Companies in Technology Commercialization University Research – Development Steps to Commercialization	Bipin V. Vora, Fuels and Petrochemicals Division/Group 16, UOP (retired)
2:00 – 2:25 PM	Imagination Powering Local Economies: The Role of University Research and Technology Development in Fostering Growth of Local Economies	Justin Anderson, Wisconsin Alumni Research Foundation - WARF

Back to Basics – Part II		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	Fundamentals of Heat Exchangers	Michael Buettner, Alfa Laval
3:30 – 3:55 PM	Steam Asset Management – More Than a Steam Trap Survey	Brian Kimbrough, Armstrong International, Inc
4:00 – 4:25 PM	Refinery Heat Efficiency	Rick Clute, Oil & Gas, Power Solutions Team, Rockwell Automation

Program Grid: Technical Sessions - Thursday, November 10, 2011

University Process Research - II		Location: Tower Rm 603
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	Thermal Management and Safety of Li-Ion Batteries	Said Al-Hallaj, Chemical Engineering, University of Illinois at Chicago / AllCell Technologies LLC
3:30 – 3:55 PM	Debottlenecking Metabolic Pathways to Increase Yield and Productivity	Keith E.J. Tyo, Chemical and Biological Engineering, Northwestern University
4:00 – 4:25 PM	New Materials for Challenges in Adsorption and Catalysis Related to Separations	Justin M. Notestein, Chemical and Biological Engineering, Northwestern University

Natural Gas		Location: Tower Rm 613
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	Gas Shales – A Supply Game Changer, If Done Right!	Jordan Ciezobka, Gas Technology Institute
3:30 – 3:55 PM	World Scale LNG Feed Gas Pretreatment: An Integrated Approach	Stanislav Milidovich, UOP LLC

Program Grid: Technical Sessions - Friday, November 11, 2011

Keynote Presentation		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
8:15 – 8:20 AM	Introduction to Keynote Speaker	Reza Mostofi-Ashtiani / Adam Kanyuh, UOP, Co-General Arrangements Committee Chairs
8:20 – 9:25 AM	Keynote – Improving Energy Efficiency in Industrial Use: Why Water Matters	Narasimha Rao, Nalco Division Vice President of R&D, Innovation Marketing

Food in Chicago and Midwest		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
9:30 – 9:55 AM	Critical Barriers to Bioenergy	Seth W. Snyder, Energy Systems, Argonne National Laboratory
10:00 – 10:25 AM	Combined Heat and Power (CHP) in the Food Processing Industry - When Does It Make Sense	John Cuttica, DOE Energy Resource Center, University of Illinois
10:30 – 10:55 AM	Increasing Role of Membrane Filtration As An Energy Saver Unit Operation	Shanti Bhushan, GEA Filtration, Process Engineering Inc
11:00 – 11:25 AM	Drying Systems in the Food Industries – Designing for Efficiency	Adrian Dee, GEA Barr-Rosin
11:30 – 11:55 AM	Tour of Geothermal Plant	

Program Grid: Technical Sessions - Friday, November 11, 2011

Specialty Topics – How to		Location: Tower Rm 605
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	Combined Heat and Power - CHP - Basics	To Be Determined
1:30 – 1:55 PM	Smaller Power: Microthurbines and Fuel Cells	To Be Determined
2:00 – 2:25 PM	Hooking up to COMEDS Smartgrid	To Be Determined

University Process Research – III		Location: Tower Rm 603
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	Investigations On Geothermal Heat Pump Systems Using Treated Waste Water As Energy Source	Huajun Yuan and Sohail Murad, University of Illinois at Chicago
1:30 – 1:55 PM	An Overview of Energy Research in the Department of Chemical Engineering At the University of Illinois At Urbana-Champaign	Christopher V. Rao, Chemical and Biomolecular Engineering, University of Illinois, Urbana Champaign
2:00 – 2:25 PM	New Methods for Defect Engineering in Semiconductors for Energy Applications	Prashun Gorai and Edmund G. Seebauer, Chemical & Biomolecular Engineering, University of Illinois at Urbana-Champaign

Program Grid: Technical Sessions - Friday, November 11, 2011

Water – Energy Issues		Location: Tower Rm 613
Time	**Presentation Title**	**Speaker(s)**
1:00 – 1:25 PM	Thermodynamic Modeling to Manage the Overlap Between Demand and Supply Energy Initiatives	Mitch Morgan, Nalco Company
1:30 – 1:55 PM	Energy Efficiency: Greenhouse Gas Reduction Is Money Saved	Lee Ferrell, Water Wastewater Competency Center, Schneider Electric
2:00 – 2:25 PM	Energy Efficient Alternative for Hazardous Air Pollutant Control	Gregory Varret, Environ

Bio-tech		Location: Tower Rm 603
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	Catalytic Conversion of Carbohydrates to Renewable Fuels and Chemicals Using the BioForming Process	Paul Blommel, Virent
3:30 – 3:55 PM	Fuels and Chemicals From Industrial Gases	Jeremy Owen, LanzaTech
4:00 – 4:25 PM	Metabolic Engineering of Algae for Biofuel Production	John A. Morgan, School of Chemical Engineering, Purdue University

Program Grid: Technical Sessions - Friday, November 11, 2011

University Research – IV		Location: Tower Rm 613
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	A Systems Analysis Approach to Green Energy	Urmila D. Diwekar, Vishwamitra Research Institute, Center for Uncertain Systems: Tools for Optimization and Management
3:30 – 3:55 PM	Economic MPC with Infinite Horizon	Donald J. Chmielewski and Benjamin P. Omell, Chemical and Biological Engineering, Illinois Institute of Technology
4:00 – 4:25 PM	Real-Time Water and Energy Management in Power Plants and Implications in Electricity Markets	Victor M. Zavala[1], Juan M. Salazar[2], Emil Constantinescu[1] and Urmila D. Diwekar[2], (1)Mathematics and Computer Science, Argonne National Laboratory, Argonne, IL, (2)Vishwamitra Research Institute, Center for Uncertain Systems: Tools for Optimization and Management

Safety		Location: Tower Rm 603
Time	**Presentation Title**	**Speaker(s)**
3:00 – 3:25 PM	The 1999 Ford Power Plant Explosion and Fire	Kim Mniszewski, FX Engineering, Inc
3:30 – 3:55 PM	Explosions	Ronald Pape, Engineering Systems Inc
4:00 – 4:25 PM	Tales From Life As a Plant Commissioning Engineer, and How the Lessons Learned Can Be Applied to Everyday Plant and Personal Life	Mike Moosemiller and Peter G. Herena, Baker Engineering and Risk Consultants

Pre-College Student Outreach Program

This high school outreach program is presented in parallel with the American Institute of Chemical Engineers' (AIChE) Midwest Regional Conference. The goal is to expose students to the profession of chemical engineering and engineering in general, and give students the opportunity to **interact with professional engineers, engineering students, and engineering faculty**. Students will come away from the program with an understanding of what chemical engineers do, how they touch our lives, and how to pursue a career in engineering.

Prof. Al Sacco

Event Schedule

9:30 - 9:55	Student Arrival
10:00 - 10:05	Welcome Remarks and Program Overview
10:05 - 11:05	Chemical Engineering in Space (Astronaut Al Sacco)
11:05 - 11:30	Engineering Contest
11:30 - 11:55	Panel Discussion – Engineering Careers
12:00 - 1:00	**Lunch with Engineering Professionals**
1:00 - 2:00	Robotics Demonstrations/Tours
2:00	Students Depart

UIC

AIChE Chicago

Keynote Address – Thursday

BP Whiting Refinery and Modernization Project

Nick Spencer, BP Whiting Refinery Business Unit Leader

Thursday, November 10, 2011
Tower - Rm 605 (University of Illinois at Chicago)

Summary:

Nick Spencer, Business Unit Leader of the BP Whiting Refinery and Modernization Project, will speak about the rich history of this massive refinery in Whiting Indiana. He'll then focus on the reasons for the modernization project and what is actually being built to sustain the refinery for the future.

Bio:

Nick Spencer serves as the Whiting Refinery Business Unit Leader since October 2009 coming to BP from ConocoPhillips. Previous to this, Nick held the position of General Manager Middle East and North Africa Refinery Marketing and Transportation.

In 1980, he joined the Humber refinery in England and worked in process engineering and projects before taking on a series of supervisor roles at the refinery. In 1995, he transferred to Conoco headquarters in Houston to lead the operations optimization team for the company's refining and marketing activities in Gulf Coast region. He moved to Lake Charles, LA the following year to serve as operations manager at Conoco's refinery in Westlake.

After a term at Harvard business School, he moved to Ponca City refinery, Oklahoma, in 1999 as refinery manager. In 2002, he transferred back to the UK as general manager of the Humber refinery. Following this assignment, he relocated to London as general manager of European Refining and in September 2006 he moved to Abu Dhabi to lead two new Refinery development projects, one in Saudi Arabia and one in Fujairah.

A native of England, Nick earned a first-class honors degree in chemical engineering at the University of Manchester Institute of Science and Technology. He also successfully completed the General Manager Program at Harvard Graduate School of Business Administration.

Nick and his wife, Angela, reside in Chicago, IL.

Keynote Address – Friday

Improving Energy Efficiency in Industrial Use: Why Water Matters

Narasimha Rao, Nalco Division Vice President of R & D, Innovation Marketing

Thursday, November 10, 2011

Illinois Room (University of Illinois at Chicago)

Summary:

Water is the heat transfer medium of choice in industry, thanks to its plentiful availability and excellent thermal properties. Whether through process heating and cooling, or waste water treatment, water is associated with nearly 70% of the energy in an industrial plant. In the industrial world, the parameter of interest is water quality more than quantity. Water quality directly impacts corrosion, scaling and microbial activity which in turn impact energy efficiency, asset integrity, product quality and therefore, capital and operating expenses. Managing water effectively, is therefore of great importance in managing energy. Doing this involves a holistic approach involving understanding of the water and energy balance at the plant level, a fundamental understanding of process and how water chemistry impacts the process, and modeling tools to predict how the water and energy balance can be impacted through chemical, operational or mechanical means. While a lot of attention has been paid lately to energy efficiency in non-industrial sectors, there is a significant need and demand for innovations and investments to improve energy efficiency in the industrial space.

Bio:

Dr. NM Rao joined Nalco in 1990 after finishing his PhD in chemistry from University of Illinois at Urbana-Champaign. He has a BS in Chemical Engineering from Madras University, India and a MS in Chemical Engineering from Southern Illinois University at Carbondale. He has been involved in innovation related to Water and Energy Optimization throughout his career and has led the development and commercialization of several industry leading offerings including the TRASAR 3000, 3D TRASAR®, and Nalco 360™ Service. Over the years, he has held various R & D and Innovation related positions, including a stint in Asia Pacific and currently serves a multi-faceted role as Division Vice President of R & D, Innovation Marketing, and Automation. His inventions have resulted in 7 patents and he has been widely recognized including the R&D 100 award, the 2008 Presidential Green Chemistry Award, and the 2010 Global Water Award.

Dinner Presentation – Thursday

The Production of Gasoline and Diesel from Biomass through Integrated Hydropyrolysis and Hydroconversion (IH2)

Dr. Martin Linck, Principal Engineer, GTI

Thursday, November 10, 2011
Illinois Room (University of Illinois at Chicago)

Summary:

Integrated hydropyrolysis and hydroconversion (IH2) is a new process which is in process development at GTI which converts biomass of all types, to gasoline and diesel fuels. This process has the potential to revolutionize biofuels conversion technology, producing high quality hydrocarbon biofuels containing less than 2% oxygen from wood, algae, corn stover, and lemna in a relatively simple inexpensive process. The IH2 fuels can be produced at relatively low cost and also reduce greenhouse gas emissions by roughly 90% based on initial LCA analysis.

Bio:

Dr. Martin Linck (Principal Engineer, Gas Technology Institute) has worked in fields related to energy, combustion, and propulsion since 2002. Originally trained as a chemical engineer at the University of Colorado, his graduate work at the University of Maryland dealt with laser-based investigations of combustion and highly-dynamic two-phase flows for military propulsion applications. Since 2006, he has directed and executed development of gasification, pyrolysis, and hydropyrolysis pilot plants, as well as ultra-efficient burners for industrial heating. His research now deals entirely with the development of renewable fuels from biomass, primarily via catalyzed hydropyrolysis and hydrodeoxygenation in integrated, allothermal processes.

Thursday Plenary – Energy Success Stories

Thursday, November 10, 2011: 9:30 AM
Tower - Rm 605 (University of Illinois at Chicago)

Description:

- MSW---> Hydrogen - Bio Fuels - Renewable Manufacturing - Combined Cycles - High Efficiency Process - Gasification of MSW

Energy Reduction in An Ethanol Distillation - A Simulations Case Study

Thursday, November 10, 2011: 9:30 AM
Tower - Rm 605 (University of Illinois at Chicago)
Jose Leboreiro, Research Division, Archer Daniels Midland, Decatur, IL

The increasing cost of crude oil and environmental awareness has sparked interest in biofuels. Corn-based ethanol is the most used biofuel in the USA; an estimated 13 billion gallons of ethanol were produced during 2010. The economic viability of biofuels and the reduction of greenhouse gases depend in part on the energy efficiency of the production process. A significant source of the energy used in production is from the distillation process used to recover the ethanol from the fermentation broth. In the present study, a rigorous simulation of a distillation column was formulated and validated using plant data. The simulation was used to study the performance of the unit and explore alternative modes of operation. The study indicated potential for significant energy savings by modifying the operation of the column without substantial capital investment. The energy saving predicted by the model was attained in the plant once the operation of the distillation column was modified following the simulation work; the emission of greenhouse gases was significantly reduced due to the energy savings.

Waste Management - Landfill Gas Renewable Energy

Thursday, November 10, 2011: 10:00 AM
Tower - Rm 605 (University of Illinois at Chicago)
Bill Gamlin and **Rod Stipe**, Waste Management Inc, IL

Natural anaerobic decomposition of organic waste in a landfill creates a gas that is about 50% methane when it is produced. Methane is the primary fossil fuel component of natural gas and any technology or application that uses natural gas can also use landfill gas. Prior to these applications, Landfill gas was flared, but it now is presently used throughout the country in Electricity Generation, Industrial Fuel (“Medium Btu”), Natural Gas (“High Btu”) and LNG/CNG vehicular fuels.

Geothermal and Co-Generation At UIC

Thursday, November 10, 2011: 10:30 AM
Tower - Rm 605 (University of Illinois at Chicago)
Sohail Murad, Chemical Engineering, University of Illinois at Chicago, Chicago, IL

University of Illinois at Chicago is a virtual "City within a City" with over 40,000 students, staff and faculty. It is only natural that energy conservation be a focus and here are two succes stories:

GEOTHERMAL ENERGY- allows UIC to heat and cool the building for about half the energy consumption of a conventional year round heating and cooling system. Due to the level of success and savings demonstrated by Grant Hall (partially funded by the Illinois Clean Energy Community Foundation) the well field has been expanded to serve another classroom building, Lincoln Hall (currently under renovation to be LEED Silver certified) and subsequently Douglas Hall. Lincoln Hall has a completion date of summer 2009 and Douglas Hall is scheduled to begin the year-long renovation in summer of 2010. These buildings will operate on one geothermal well system that has already been installed. The funding for these renovations is from the Academic Facilities Maintenance Fund. Assessment for the operation and maintenance of classroom space and from development funds. An additional benefit of geothermal energy includes the ability to regulate space temperatures during real time, providing greater comfort especially during transition seasons. This makes for a much better learning space.

COGENERATION - The ability of power plants to purchase fuel at a reduced cost created a unique arrangement for power generation at the University of Illinois. Utility Operations, an independent organization operating within the University, runs its own cogeneration plants on the UIC campus. Cogeneration is the simultaneous production of heat and power in a single thermodynamic process. Instead of discarding the heat produced by the power production process, it is captured and used to provide space heating and hot water heating, thus eliminating the added expense of burning fuels for the sole purpose of space heating. This plant runs primarily on natural gas which is cleaner than coal and fuel oil when considering hazardous air pollutants and carbon dioxide. When operated under certain conditions, cogeneration can be beneficial and helps lower the emission of carbon and sulfur dioxide pollutants into the air.

Back to Basics - I

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 605 (University of Illinois at Chicago)

Description:

This session will focus on tools tips and techniques for folks in plant operations as well as professional engineers looking to review or upgrade their skills. The focus is on energy of course! - Pumps - Evaporators - Chillers

Chair:
Patrick Shannon
Email: shannoph@middough.com

Should I Use Steam or Electric for My Heat Management System

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
Paula Peterson and **Jim Dennington**, Tyco Thermal Controls

Steam or Electric Heat Tracing....which way to go...find out here

Centrifugal Pumps 101

Thursday, November 10, 2011: 1:30 PM
Tower - Rm 605 (University of Illinois at Chicago)
Billy Stout, Clyde Union Pumps

- What is a Centrifugal Pump
- Pump Nomenclature
- Types of Centrifugal pumps
- Pump Mechanics
- Pump Selection
- Pump Curves

Optimal Evaporator Design

Thursday, November 10, 2011: 2:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
Ralph Scully, InCon Technologies

Evaporators come in all shapes, sizes and energy sources. Minimize energy and scaling by appropriate selection.

Refining Energy Updates

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 613 (University of Illinois at Chicago)

Description:

A look into energy utilization in todays modern refinery - Feed Upgrades - Environmental - Catalysis - Upstream Issues

Chair:
Jerry Wilks
Email: gwilks@citgo.com

CITGO - Lemont Refinery Energy Projects

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Aaron Wright, Envoy Development

This 140,000bbl/day refinery is always looking for ways to reduce its energy footprint. This paper will exam this theme.

Enhanced Testing Capability for Asphaltene Stability Prediction and Crude Compatibility"

Thursday, November 10, 2011: 1:30 PM
Tower - Rm 613 (University of Illinois at Chicago)
Sai Reddy Pinappu, Baker Hughes and **Corina L Sandu**, Baker Hughes Incorporated

Opportunity crude processing often provides economic incentives to refiners due to their appealing costs. However, fouling and coking associated with processing of these crudes are often detrimental effects mainly due to incompatible feeds and/or high solids content. Baker Hughes has developed a portable, fast, and enhanced testing capability technology to predict the stability of these crudes and their blends with respect to asphaltenes.

This presentation introduces Baker Petrolite Field ASIT services™ technology and presents the results of crude oil stability, compatibility, and blend optimization. Moreover, the effect of chemical treatments on stability improvement and dosage optimization will be discussed. Thus, an understanding of how to control and/or delay the precipitation of unstable asphaltenes offers significant economic advantage to refiners.

Refinery Combined Heat & Power (CHP) with Spinning Reserve (SR): Profitably Reduce Green House Gases

Thursday, November 10, 2011: 2:00 PM

Tower - Rm 613 (University of Illinois at Chicago)

Suresh Jambunathan, Recycled Energy Development, LLC, Westmont, IL

Energy, usually as power and steam is increasingly one of the most volatile and dominant contributors to industrials' (eg: refineries) bottom line. And yet it is also the most wasted of resources. This isn't because industrials are lazy, but rather the result of a laser-like focus on core refining operations that often treated energy as non-core, and therefore starved for both capital and human resources. Within this cloud lies a silver lining: we don't need to place bets on unproven technology nor hope for energy price volatility to disappear. We simply need to deploy existing energy recycling technologies such as combined Heat and Power (CHP) and incorporating grid Spinning Reserve (SR) to profitably reduce greenhouse gas emissions.

Problem: A refinery needs reduced steam cost & the grid needs reliable, base-loaded power.

Assertion: Current systems are inefficient. The refinery boiler steam system fails to maximize value while grid central generation has poor fuel-to-power efficiency, suffers from T&D losses and is forced to maintain inefficient spinning reserve to meet peak capacity.

Solution: Install "electrically oversized" CHP at refineries; steam cost is lowered and the grid gains multiple benefits from distributed generation including quick ramp-up as needed via SR.

Greenhouse gases are reduced because CHP with SR power offsets remote central generation

Such an arrangement is an economic/environmental win-win for all stake-holders – the refinery, the local grid, the surrounding community and the environment. Finding and capitalizing on these opportunities requires expertise in industrial processes, power generation, finance, electricity regulation plus capital.

University Process Research - I

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 603 (University of Illinois at Chicago)

Description:

We are pleased to present a series of sessions highlighting on-going research development efforts occurring at the universities in the Midwest Area. We expect participation from several universities Midwest area. This provides an opportunity for university researchers to present their work to industry participants at the conference, draw their interest in further commercialization, and get input as to industry and societal needs and techno-economic viability. For the industry participant, it is an opportunity to identify promising new leads, as well as steer the academic research to address societal and industry needs. This year's conference theme is "Energy is Everything - Game Changers" covering various chemical industries geared toward the crucial topic of energy. This two day conference will include 4 sessions on University Research.

Chair:
Sohail Murad
Email: murad@uic.edu

Co-Chair:
Bipin V. Vora
Email: bvvora@comcast.net

Role of University Startup Companies in Technology Commercialization

Thursday, November 10, 2011: 1:00 PM
Tower - Rm 603 (University of Illinois at Chicago)
Robert F. Anderson, Corporate Relations, Illinois Institute of Technology, Chicago, IL

The traditional university role of performing fundamental research leaves a large gap between the laboratory stage "proof of principle" and the generation of economic benefits in the commercial marketplace. Research funding for universities from the federal government tends to focus on basic research. Companies usually prefer to license technology with most of the risk taken out. This risk reduction normally occurs via the development component of the research and development process. Unfortunately, the cost of D is often 10 plus times the cost of R, which puts this effort out of reach of most universities. In addition, the opportunity for publication and contribution to advancing the state of the art science (the usual focus of university research) is limited as the development activity concentrates on such issues as economic tradeoffs, catalyst life, feedstock impurities, manufacturing processes, corrosion and other materials of construction issues, product specifications, and mechanical hardware problems.

To bridge this gap, Illinois Institute of Technology has put in place a series of practices to address the problems that stand in the way of the university’s ability to pursue commercial success for new technology. Our primary practice is to establish startup companies by the inventing faculty members who continue to guide the technology development process into the commercial marketplace. Additional contributors are undergraduate students working on these more-practical problems, mutually beneficial strategic alliances with existing commercial companies, incubator facilities with their ancillary networking potential, senior executives and alumni acting as friends of the university in mentoring entrepreneurial faculty, the technology transfer function of the university, the university's marketing and communications professionals, and alignment of startup company interests with the university's goals via equity investment in the company. This presentation describes how these practices have also provided benefits to our development partners from industry.

University Research – Development Steps to Commercialization

Thursday, November 10, 2011: 1:30 PM

Tower - Rm 603 (University of Illinois at Chicago)

Bipin V. Vora, Fuels and Petrochemicals Division/Group 16, UOP (retired), Des Plaines, IL

There is lot of good research work is being done at many universities, but only few gets to commercial realities. University researchers, academics often wonder why industry executives or entrepreneurs or venture capitalists are running to them to sign off to the next stage. The barrier is very high, often not visualized or understood. This presentation out lines all necessary steps one must go through from research to development, scale-up and commercialization.

A project from research commercialization has to pass through not one but many hurdles. One of the first is to pass techno-economic analysis. The investment needed for further development and scale-up of the technology and the duration of the time it would take are if not always, often significantly under estimated at the research stage. The author will discuss this and other criteria in more detail with few examples

Imagination Powering Local Economies: The Role of University Research and Technology Development in Fostering Growth of Local Economies

Thursday, November 10, 2011: 2:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Justin Anderson, Wisconsin Alumni Research Foundation - WARF, Madison, WI

"We need to out-innovate, out-educate, and out-build the rest of the world…This is our generation's Sputnik moment." These words, from President Obama during his State of the Union Address on January 25, 2011, highlight the importance of innovation and its impact on the economy. Investments in education, research, and science are important – not only for the knowledge generated, but also for the potential to create new jobs and industries while improving our overall quality of life. Where will the next big idea originate, and who will take that idea and turn it into a product or a business? The answer could be right here and the person could be you. This session will provide the framework protecting your ideas, identifying resources, and engaging your inner entrepreneur.

The University of Wisconsin-Madison Alumni Association Research Foundation (WARF). processes new inventions, application preparation, and patent prosecution of physical and life science technologies in the areas of chemistry, engineering, biotechnology and medical devices. WARF was created in 1925 to patent and license the discoveries of UW-Madison researchers. WARF manages 800 pending and 1,200 issued U.S. patents. It offers more than 1,000 technologies for licensing and maintains more than 380 active commercial license agreements. It also holds equity in 40 UW-Madison spinoff companies.

Back to Basics - II

Thursday, November 10, 2011: 3:00 PM
Tower - Rm 605 (University of Illinois at Chicago)

Description:

This session will focus on tools tips and techniques for folks in plant operations as well as professional engineers looking to review or upgrade their skills. The focus is on energy of course! Continuing from previous session - Heat Exchangers - Steam Traps - Heat Tracing

Chair:
Michael Buettner
Email: mike.buettner@alfalaval.com

High Efficiency Plate Heat Exchanger Basics

Thursday, November 10, 2011: 3:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
Michael Buettner, Alfa Laval

This presentation will discuss the decision process of using high efficiency plate heat exchanger versus more traditional technology. Topics will include proper design for heat recovery, managing fouling, the effect of operating conditions, and reducing over-all life cycle costs.

Steam Asset Management – More Than a Steam Trap Survey

Thursday, November 10, 2011: 3:30 PM
Tower - Rm 605 (University of Illinois at Chicago)
Brian Kimbrough, Armstrong International, Inc

Now more than ever, maintaining an energy efficient plant is not only critical to the environment, but necessary for sustainability in a global economy. Implementing a successful “Steam Asset Management” program requires the full support of management as well as a motivated steam team. With the proper tools and training, a successful program can insure “Best Practice” steam and condensate solutions…more than just a steam trap survey.

Refinery Heat Efficiency

Thursday, November 10, 2011: 4:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
Rick Clute, Oil & Gas, Power Solutions Team, Rockwell Automation, Burr Ridge, IL

Efficient Energy Utilization in Refineries - HOW TO

University Process Research - II

Thursday, November 10, 2011: 3:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Description:

We are pleased to present a series of sessions highlighting on-going research development efforts occurring at the universities in the Midwest Area. We expect participation from several universities Midwest area. This provides an opportunity for university researchers to present their work to industry participants at the conference, draw their interest in further commercialization, and get input as to industry and societal needs and techno-economic viability. For the industry participant, it is an opportunity to identify promising new leads, as well as steer the academic research to address societal and industry needs. This year's conference theme is "Energy is Everything - Game Changers" covering various chemical industries geared toward the crucial topic of energy. This two day conference will include 4 sessions on University Research.

Chair:
Sohail Murad
Email: murad@uic.edu

Co-Chair:
Bipin V. Vora
Email: bvvora@comcast.net

Thermal Management and Safety of Li-Ion Batteries

Thursday, November 10, 2011: 3:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Said Al-Hallaj, Department of Chemical Engineering, University of Illinois at Chicago, Chicago, IL; AllCell Technologies LLC, Chicago, IL

With fluctuating crude oil prices, increased pressure (and potentially legislation) to limit CO_2 emissions, and greater public concern about air quality and the environment, there is tremendous demand and increased incentives to reduce our dependence on gasoline and diesel powered vehicles.

In addition to these trends, battery technology has improved enormously over the past 20 years with advanced Li-ion batteries coming into widespread use within the last decade. These new batteries have enabled the rapid growth of portable computers, cell phones, and more recently hybrid electric automobiles and electric bikes. However, at the same time, the high energy demands of these products have forced manufacturers to explore options for safer, longer lasting batteries.

Results from the US Department of Energy and the International Energy Agency show that Li-ion chemistries create by far the most economical, rechargeable battery based on storage density, cycle life, and weight. Li-ion has captured 100% of the cell phone, digital camera, camcorder, and laptop computer markets, and is quickly becoming the battery of choice for high-power and energy storage markets.

However, thermal management is a key technical barrier limiting the performance of Li-ion battery packs in automotive applications. Batteries perform best and are most reliable when maintained at a uniform, constant temperature within a specific range. The auto industry is exploring passive thermal management solutions that do not require a circulating thermal liquid due to concerns about reliability and system cost.

The presentation will provide an overview of the state-of-the-art of Li-ion battery technologies, auto applications and available thermal management solutions for Li-ion batteries. A brief description of AllCell's phase change material (PCM) passive thermal management system will be discussed. The PCM system utilizes heat conducting lattice materials, including graphite and copper.

Debottlenecking Metabolic Pathways to Increase Yield and Productivity

Thursday, November 10, 2011: 3:30 PM

Tower - Rm 603 (University of Illinois at Chicago)

Keith E.J. Tyo, Chemical and Biological Engineering, Northwestern University, Evanston, IL

In biofuels production, product yield is critical, as feed stock costs are a major cost of production. Productivity is also very important, as capital costs of bioreactors are directly affected. On the cellular level, increasing the flux through the product-forming metabolic pathway (a) directly results in increased macroscale productivity and (b) indirectly increases yields by having an efficient metabolic pathway that out-competes byproduct-forming metabolic pathway. In the present study, we perform a sensitivity analysis on the metabolic pathway that converts acetyl-CoA to the biodegradable polymer, poly-3-hydroxybutyrate (PHB). By varying enzyme expression levels, and growth rates in chemostats, we determined that (1) the PHB pathway is limited by the enzyme 3-hydroxybutyryl-CoA reductase, and (2) flux through the PHB pathway is limited by pathway expression, not precursor availability. While such debottlenecking exercises are routine in chemical process, analogous debottlenecking on the cellular level can dramatically improve biocatalyst properties. Such debottlenecking will be vital in the development of cell-based biofuels processes.

New Materials for Challenges in Adsorption and Catalysis Related to Separations

Thursday, November 10, 2011: 4:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Justin M. Notestein, Chemical and Biological Engineering, Northwestern University, Evanston, IL

The development of new materials in the Notestein laboratory will be described. These new materials tackle challenges in Energy by proposing new approaches to catalysts or adsorbents. Adsorbents to be described include new materials for better understanding the separation of butanol and other hydrophobic species from water and for CO2 capture. Novel catalysts include bifunctional materials for hydrotreating and oxide materials for the conversion of biomass into chemicals.

Natural Gas

Thursday, November 10, 2011: 3:00 PM
Tower - Rm 613 (University of Illinois at Chicago)

Description:

The Next Big Thing! - Processing - Production - End Use

Chair:
Brian Gahan
Email: bgahan@laserrocktech.com

Gas Shales – A Supply Game Changer, If Done Right!

Thursday, November 10, 2011: 3:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Jordan Ciezobka, Gas Technology Institute

Supply of the cleanest burning fossil fuel, natural gas, is on the decline from conventional sources. There is a huge potential to supply the United States with enough natural gas to last over 100 years from unconventional Shale reservoirs. However the technology used to economically produce gas from the Gas Shales, hydraulic fracturing and horizontal drilling, is not well understood by the public, and coupled with environmental concerns leads to misconceptions and opposition. With intelligent, good-faith communication, environmental and natural gas leaders are closing the perceived gap to thoughtful energy infrastructure development. This presentation will look at historical supply of natural gas and the evolution of technology that enabled gas production from Shale reservoirs. In addition, it will explore the negative media and public sentiment that has arisen due to lack of transparency and information that is easy to understand.

World Scale LNG Feed Gas Pretreatment: An Integrated Approach

Thursday, November 10, 2011: 3:30 PM
Tower - Rm 613 (University of Illinois at Chicago)
Stanislav Milidovich, UOP LLC, Des Plaines, IL

Natural gas streams are typically treated for control and removal of multiple acid gas contaminants and in most cases these compounds cannot be removed cost effectively by a single technology. The geographic origin of the gas will define the quantity and type of acid gases that must be dealt with. A complex project for treating Middle East source natural gas will be required to deal with mercaptan sulfurs as well as the traditional H2S. The addition of mercaptan sulfur as a contaminant makes the acid gas control a little more technically challenging. The type and quantity of acid gas components that need to be controlled will dictate the number of technologies and units required to meet required product specifications. The number of technology units and how they are integrated will significantly impact overall project economics and success.

UOP has designed and implemented a unique flow-scheme which is being utilized to effectively remove and control all acid gas components prior to liquids recovery. The flow-scheme takes advantage of each technology's strength while maximizing integration to minimize capital and operating costs. The flow-scheme minimizes the number of required units and optimized integration results in a very cost effective and technically comprehensive complex. This presentation will provide information on the technical approach to treat complex feed streams along with the technical advantages to the integrated design.

Poster Session - University Energy Related Topics

Thursday, November 10, 2011: 5:00 PM
Ft. Dearborn A (University of Illinois at Chicago)

Description:

Midwest Schools will present their Research with an emphasis on Energy Relevance

Sponsor:
Contributed Poster Session

Chair:
Justin M. Notestein
Email: j-notestein@northwestern.edu

A handout will be provided at the poster session with various posters being presented.

Friday Plenary Food in Chicago and Midwest

Friday, November 11, 2011: 9:30 AM
Tower - Rm 605 (University of Illinois at Chicago)

Description:
Energy Issues Related to Food Production

Chair:
Jerry Palmer
Email: jpalmer@ambitech.com

Critical Barriers to Bioenergy

Friday, November 11, 2011: 9:30 AM
Tower - Rm 605 (University of Illinois at Chicago)
Seth W. Snyder, Energy Systems, Argonne National Laboratory, Argonne, IL

Biomass is a primary clean energy resource. Successful market transformation requires consideration of sustainability, compatibility, economics, policy factors, and competition with food and feed production. Argonne's analysis provides the backbone for understanding the critical technical barriers to the growth of bioenergy. Argonne has developed novel strategies for sustainable biomass feedstock growth as well as energy-efficient bio(catalytic) conversions and separations. The work is moving from production of ethanol as a primary biofuel to hydrocarbons. The goal is to produce fuels and materials while minimizing water use and greenhouse gas emissions.

Combined Heat and Power (CHP) in the Food Processing Industry - When Does It Make Sense

Friday, November 11, 2011: 10:00 AM
Tower - Rm 605 (University of Illinois at Chicago)
John Cuttica, DOE Energy Resource Center, University of Illinois

This presentation will look at the use of combined heat and power (CHP) as an energy efficiency option in the food processing industry. The investment can be large, but the dividends can be substantial. Learn about the technologies, the equipment and how it works. The keys to the application of this technology include matching of electric and thermal loads, handling of food wastes, and proper sizing/control/integration of equipment. Anaerobic digestion, biogas production and clean up, and waste heat/natural gas fueled cogeneration are all topics to be addressed. Installations in the region will also be discussed.

Increasing Role of Membrane Filtration As An Energy Saver Unit Operation

Friday, November 11, 2011: 10:30 AM
Tower - Rm 605 (University of Illinois at Chicago)
Shanti Bhushan, GEA Filtration, Process Engineering Inc, WI

In the last decade, we have seen tremendous progress in membrane chemistry resulting into the availability of variety of good quality membranes for filtration, separation and purification. As a result, membrane filtration has been able to spread its wings beyond water and dairy applications. Today, membrane filtration has either become an integral part of a process for some industries or is being extensively experimented in some others.

Membrane filtration has primarily been categorized into microfiltration (MF), ultrafiltration (UF), nanofiltration (NF) and reverse osmosis (RO). Evaporation has been the primary means of achieving concentration but in the recent years, we have seen that RO has been increasingly adopted for the beginning portion of the concentration process. For example, increased energy savings have been observed in the dairy and fruit juice industries using RO which has generally been used to concentrate to about 25 % total solids. Evaporator has therefore been needed only for concentration beyond 25 % total solids. Reverse osmosis has also been able to concentrate whole milk to about 25-28% total solids. The concentrated milk when shipped to milk drought areas has resulted into reduced gas and energy consumption during transportation. Many more food and industrial applications have now been using the concept of preliminary concentration by RO not just for energy saving but also for better quality product.

Drying Systems in the Food Industries – Designing for Efficiency

Friday, November 11, 2011: 11:00 AM
Tower - Rm 605 (University of Illinois at Chicago)
Adrian Dee, GEA Barr-Rosin

This presentation will review the application of drying technologies in the food, food and ingredient industries and the development of thermal integration and heat recovery to minimize production costs and improve environmental responsibility. A comparison of different system configurations will be discussed including open circuit and exhaust gas recycle leading to the “game changing” SSD^{TM} technology and the opportunity for heat recovery and system integration.

Specialty Topics - HOW TO

Friday, November 11, 2011: 1:00 PM
Tower - Rm 605 (University of Illinois at Chicago)

Description:

- Fuel Cells - Gasifiers - Electric Generation - Waste to Energy

Combined Heat and Power - CHP - Basics

Friday, November 11, 2011: 1:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
William A. Ryan, Energy Resources Center, University of Illinois-Chicago, Chicago, IL

Chemical Engineers should always look for ways to use waste heat. Heres how

Smaller Power: Microthurbines and Fuel Cells

Friday, November 11, 2011: 1:30 PM
Tower - Rm 605 (University of Illinois at Chicago)
William A. Ryan, Energy Resources Center, University of Illinois-Chicago, Chicago, IL

Co-Generation Fundamentals - Combining Process and Energy Generation

Hooking up to COMEDS Smartgrid

Friday, November 11, 2011: 2:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
William A. Ryan, Energy Resources Center, University of Illinois-Chicago, Chicago, IL

A stumbling block to Co-Generation should not be the Grid. COMED will explain how to get your project connected

University Research - III

Friday, November 11, 2011: 1:00 PM
Tower - Rm 603 (University of Illinois at Chicago)

Description:

We are pleased to present a series of sessions highlighting on-going research development efforts occurring at the universities in the Midwest Area. We expect participation from several universities Midwest area. This provides an opportunity for university researchers to present their work to industry participants at the conference, draw their interest in further commercialization, and get input as to industry and societal needs and techno-economic viability. For the industry participant, it is an opportunity to identify promising new leads, as well as steer the academic research to address societal and industry needs. This year's conference theme is "Energy is Everything - Game Changers" covering various chemical industries geared toward the crucial topic of energy. This two day conference will include 4 sessions on University Research.

Co-Chair:
Bipin V. Vora
Email: bvvora@comcast.net

Investigations On Geothermal Heat Pump Systems Using Treated Waste Water As Energy Source

Friday, November 11, 2011: 1:00 PM
Tower - Rm 603 (University of Illinois at Chicago)
Huajun Yuan, University of Illinois - Chicago, Chicago, IL and **Sohail Murad**, Chemical Engineering, University of Illinois at Chicago, Chicago, IL

Geothermal energy can be used for generating electricity and providing direct heat for applications such as space heating and cooling, water heating, aquaculture and industrial processes. Geothermal heat pump (GHP) is a central heating/cooling system that pumps heat to or from the ground to provide heating and air condition. There has been a significant recent interest in geothermal energy as an efficient alternative to conventional heat, ventilation and air conditioning (HVAC) systems. This interest primarily lies in the almost 50% reductions in energy cost historically achieved with such systems, and a relative rapid rate of return of additional capital associated with geothermal systems. Extreme weather conditions in Illinois make it an ideal state for heating/cooling using geothermal energy. On the other hand, water harvesting and reuse as well as renewable energy play an important role in greater sustainability of ecosystems. For systems which have access to water, another attractive alternative is to use open or closed loop geothermal pond systems. Energy exchange with water is possible at a much higher rate than with soil and installation costs are significantly lower. We have designed and installed a geothermal HVAC system at the Kirie Waste Water Treatment Facility in Des Plaines, IL. The effluent water in the water treatment plant is discharged at temperatures between 55-65 ^{o}F and at rather high flow rates (50 -100 MGD) which is ideal for use in geothermal systems. In this work we designed two different geothermal systems using treated waste water as energy source, i.e., open loop and close loop geothermal systems. The main difference between the open and close loop pond geothermal system lies in whether the water from the pond is circulated in the geothermal system for more efficient heat exchange, or if the exchange in energy takes between water in a closed system exchanging energy with the water in the pond, without actually removing any water from the pond. The two processes were simulated using Aspen Plus simulation package, the efficiencies were compared and coefficients of performance (COP) of these two systems at various conditions were calculated. The possibility of further increasing the efficiency and applicability of geothermal systems was also explored. The work can contribute to the increased use of geothermal energy in Illinois and developing more sustainable energy systems.

An Overview of Energy Research in the Department of Chemical Engineering At the University of Illinois At Urbana-Champaign

Friday, November 11, 2011: 1:30 PM

Tower - Rm 603 (University of Illinois at Chicago)

Christopher V. Rao, Chemical and Biomolecular Engineering, University of Illinois, Urbana Champaign, Urbana, IL

I will provide an overview of energy-related research in the Department of Chemical Engineering at UIUC. Particular emphasis will placed on the Energy Biosciences Institute -- a joint institute between UIUC and the University of California, Berkeley -- funded by BP.

New Methods for Defect Engineering in Semiconductors for Energy Applications

Friday, November 11, 2011: 2:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Prashun Gorai, Department of Chemical and Biomolecular Engineering, University of Illinois, Urbana, IL and **Edmund G. Seebauer**, Chemical & Biomolecular Engineering, University of Illinois at Urbana-Champaign

Diffusion in semiconductors plays a key role in numerous technological applications, such as photocatalysis and electrical conduction in solid-state sensors. Such diffusion is mediated primarily by point defects such as interstitial atoms and vacancies, so controlling their number and diffusion rate by “defect engineering” is important for optimization of processing and device operation. The present work discusses the discovery of new methods for such defect manipulation. Solid-state diffusion measurements together with detailed modeling and optical photoreflectance measurements have identified new interactions between the surface and bulk point defects with chemistry that is comparable in richness to the reactions of surfaces with gases. The chemistry is governed by near-surface electrostatic effects and surface bond insertion/generation mechanisms. Taken together, these findings have direct applications for solar hydrogen production, and catalysis for fuels production and fuel cells.

Water - Energy Issues

Friday, November 11, 2011: 1:00 PM
Tower - Rm 613 (University of Illinois at Chicago)

Description:

There is a close relationship between water and energy, many times referred to as the "Water and Energy Nexus". Water happens to be the medium through which energy is transferred in industrial systems, with over 70% of the energy within an industrial site being impacted. It takes a significant amount of water to produce electrical energy both in terms of water to cool as well as water for steam. Conversely, a significant amount of energy is needed to transfer, store, treat, convert, and discharge water within the water use cycle in any industry. A shortage of water and the worsening quality of water are causing industries to push the operating boundaries of their plant assets resulting in higher energy consumption and operational inefficiencies. This session will review ways in which the industry is responding to these challenges with new innovations and technologies to ensure a more efficient sustainable use of both water and energy for future generations.

Chair:
Gregory Corda
Email: gncorda@nalco.com

Thermodynamic Modeling to Manage the Overlap Between Demand and Supply Energy Intiatives

Friday, November 11, 2011: 1:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Mitch Morgan, Nalco Company

Complexity in energy consumption, facility production, and energy procurement can lead to decisions that ultimately hurt the financial position of a business because the interrelationships are not understood. Evaluation of those decisions through the use of a thermodynamic model that is tied to supply contract provisions allows energy projects to be evaluated for their true impact. Together, these aspects allow decisions that can be executed to deliver true savings to a facility or corporation. In this specific example, water treatment expertise evaluated the implications of energy projects on the mill water systems that would eliminate seasonal energy demand variations by utilizing liquor evaporator surface condenser waste heat. This project was estimated to reduce energy costs by 1.3 MM$/yr.

Energy Efficiency: Greenhouse Gas Reduction Is Money Saved

Friday, November 11, 2011: 1:30 PM
Tower - Rm 613 (University of Illinois at Chicago)
Lee Ferrell, Water Wastewater Competency Center, Schneider Electric

Energy usage in water treatment is a substantial cost burden and greenhouse gas contributor. In response to the ever increasing cost and availability of energy, water treatment facilities must evaluate energy usage and through energy action plans, implement energy conservation measures for each process and distribution system. The primary goal of this report is to review the energy usage in water treatment and determine how to manage it efficiently. Further, energy management will reduce the plant's carbon footprint, operational costs and assist in the reduction of power generation demand.

The objective is to identify areas where energy management can be applied by first conducting an energy audit and then developing an energy action plan to identify and implement energy conservation measures. Understanding energy usage in conjunction with legislative, power industry and water treatment drivers are major factors in energy management. Further, power industry drivers such as energy rate applications and water drivers such as facility carbon footprint are discussed.

Water treatment plant energy usage will depend on the type of water used, surface or ground, the quality of the incoming water, the pumping requirements, and the processes used to treat the water. The estimated power consumption for a 10 million gallon per day (MGD) surface treatment plant is 14,257 kWh and 18,240 kWh for a ground water plant. Note that ground water requires around 30% more energy usage than surface water.(Electric Power Research Institute (EPRI) 2002).

Energy Efficient Alternative for Hazardous Air Pollutant Control

Friday, November 11, 2011: 2:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Gregory Varret, Environ, MO

Contributors: Dr. Carl E. Adams, Jr., ENVIRON International Corp. / Dr. Lial F. Tischler, Tischlar-Kocurek / Andrew Edwards, ENVIRON International Corp. / Wallace E. Dows, III, Marathon Petroleum LLC

Many of the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations require 95% or greater removal of Hazardous Air Pollutants (HAPs) emitted from storage vessels, process vents, and wastewater unit operations. For example, the Benzene Waste Operations NESHAP (BWON) requires 98% benzene removal from a variety of emission sources at a refinery, including wastewater conveyance and initial treatment operations. Previous to the effort discussed herein, the control technologies typically acceptable to the USEPA were adsorption (e.g., carbon adsorbers), enclosed combustion (oxidizers & fuel gas systems), scrubbers and flares. These technologies can be energy intensive and are typically capital and operationally expensive. However, many of the NESHAPs allow for implementation of an Alternative Control Device, subject to achieving the same HAP removal efficiencies and specified operating and monitoring conditions.

This presentation describes innovative protocols, developed by ENVIRON and first piloted at the Marathon Petroleum Corporation (MPC) in Garyville, Louisiana, to qualify an Alternative Control Device for BWON compliance. The alternative control scheme was the use of MPC's activated sludge wastewater treatment plant (WWTP) to treat vapor collected from various BWON emission sources currently controlled by carbon adsorption. This MPC project, along with several other projects subsequently underway, will be reviewed to highlight the following aspects and benefits of ENVIRON's VOC BioTreat™ innovative technology:

- Overview of the alternative bio-treatment technology and process steps for its implementation: how it works, regulatory approval aspects, potential applications, primary benefits.
- Protocols, approved by the USEPA, to demonstrate equivalent HAP removal efficiency for the alternative control technology, including bench-scale (BOX) and full-scale Core Column Simulation testing that delineated more realistic benzene biodegradation rates constants than the EPA default rates. Core Column tests demonstrated >99% benzene biological destruction at over 20 times the design loading.
- Re-routing vent streams from refinery wastewater conveyance and treatment units (lift stations, API separators, DNFs, IGFs, etc.) to the diffused aeration system blowers at the WWTP to biologically treat HAPs in the aeration tank.
- Case studies showing projected reductions in energy consumption and carbon footprint, as well as operating cost, when using the alternative bio-treatment in lieu of standard control technologies.
- Potential application of the protocols to any biodegradable VOCs, and how the alternative bio-treatment technology can be transferable to other NESHAPs for alternative control of organic HAPs.

Bio-Tech

Friday, November 11, 2011: 3:00 PM
Tower - Rm 605 (University of Illinois at Chicago)

Description:

- What's really happening? - What needs to happen - Where does it all fit in - Synthetic Biology

Catalytic Conversion of Carbohydrates to Renewable Fuels and Chemicals Using the BioForming Process

Friday, November 11, 2011: 3:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
Paul Blommel, Virent

Fuels and Chemicals From Industrial Gases

Friday, November 11, 2011: 3:30 PM
Tower - Rm 605 (University of Illinois at Chicago)
Jeremy Owen, LanzaTech

This paper will describe a process to convert a variety of nonfood, low value gas feed stocks into clean bioethanol and platform chemicals. This process is able to utilise gases from industry, including steel mill, oil refinery and coal manufacturing waste gases, all with minimal conditioning. Reformed natural gas and biomass derived syngas can also be used highlighting flexibility.

Metabolic Engineering of Algae for Biofuel Production

Friday, November 11, 2011: 4:00 PM
Tower - Rm 605 (University of Illinois at Chicago)
John A. Morgan, School of Chemical Engineering, Purdue University, West Lafayette, IN

Microalgae are of critical import in the global carbon cycle and are poised as a source of biofuels. A major thrust of our research is a systems level understanding of metabolism to enable the rational manipulation of metabolic networks in photosynthetic organisms. Evaluation of the rates and yields of metabolic pathways under different environmental and genetic conditions provides the basis for effective metabolic engineering strategies. To accomplish this goal, a key tool is the measurement of intracellular metabolic fluxes. Our group firstly developed the mathematical models and measurement techniques resulting in photoautotrophic metabolic flux maps for cyanobacteria (blue-green algae). In addition, we have successfully constructed and tested constraint based models for the cyanobacteria *Synechocystis* PCC6803, and a genome scale model for the photosynthetic algae, *Chlamydomonas reinhardtii*. Experimental validation by metabolic flux analysis will be detailed for the two model organisms and the results compared with the predictions. Each of these studies demonstrates the powerful insight that mathematical analysis provides on systems of complex reaction networks.

University Research – IV
Process Power and Energy Optimization

Friday, November 11, 2011: 3:00 PM
Tower - Rm 603 (University of Illinois at Chicago)

Description:
We are pleased to present a series of sessions highlighting on-going research development efforts occurring at the universities in the Midwest Area. We expect participation from several universities Midwest area. This provides an opportunity for university researchers to present their work to industry participants at the conference, draw their interest in further commercialization, and get input as to industry and societal needs and techno-economic viability. For the industry participant, it is an opportunity to identify promising new leads, as well as steer the academic research to address societal and industry needs. This year's conference theme is "Energy is Everything - Game Changers" covering various chemical industries geared toward the crucial topic of energy. This two day conference will include 4 sessions on University Research.

Chair:
Donald J. Chmielewski
Email: chmielewski@iit.edu

Co-Chair:
Bipin V. Vora
Email: bvvora@comcast.net

A Systems Analysis Approach to Green Energy

Friday, November 11, 2011: 3:00 PM
Tower - Rm 603 (University of Illinois at Chicago)
Urmila D. Diwekar, Vishwamitra Research Institute, Center for Uncertain Systems: Tools for Optimization and Management, Clarendon Hills, IL

This talk presents a systems analysis perspective that extends the traditional plant design framework to green engineering, green energy and industrial ecology leading to sustainability. For green engineering this involves starting the design decisions as early as chemical and material selection stage on one end, and managing and planning decisions at the other end. However, uncertainties and multiple and conflicting objectives are inherent in such a design process. Green engineering principles are illustrated here using a green energy sector case study. Uncertainties increase further in industrial ecology. The concept of overall sustainability goes beyond industrial ecology and brings in time dependent nature of the ecosystem and multi-disciplinary decision making. Optimal control methods and theories from financial literature can be useful in handling the time dependent uncertainties in this problem. Decision making at various stages starting from green plant design, green energy, to industrial ecology, and sustainability is illustrated for the mercury cycling. Power plant sector is a major source of mercury pollution. In order to circumvent the persistent, bioaccumulative effect of mercury, one has to take decisions at various levels of the cycle starting with greener power systems, industrial symbiosis through trading, and controlling the toxic methyl mercury formation in water bodies and accumulation in aquatic biota.

Economic MPC with Infinite Horizon

Friday, November 11, 2011: 3:30 PM

Tower - Rm 603 (University of Illinois at Chicago)

Donald J. Chmielewski, Department of Chemical and Biological Engineering, Illinois Institute of Technology, Chicago, IL and Benjamin P. Omell, Chemical and Biological Engineering, Illinois Institute of Technology, Chicago, IL

There is a growing interest in the development of MPC algorithms that replace the traditional quadratic objective function with a purely economic objective. However, implementation of such algorithms can result in unexpected and sometimes pathological closed-loop behavior, including inventory creep-down and bang-bang actuation during active constraint intervals. This paper will illustrate some of these issues. While an infinite horizon formulation seems to be a natural route to avoiding the above myopic behavior, implementation with an infinite horizon presents a number of technical and conceptual challenges. To address these issues, a number of subtle changes to the original problem formulation will be introduced and thus will allow for a computationally robust implementation of the infinite-horizon controller.

Real-Time Water and Energy Management in Power Plants and Implications in Electricity Markets

Friday, November 11, 2011: 4:00 PM

Tower - Rm 603 (University of Illinois at Chicago)

Victor M. Zavala[1], Juan M. Salazar[2], Emil Constantinescu[1] and Urmila D. Diwekar[2], (1)Mathematics and Computer Science, Argonne National Laboratory, Argonne, IL, (2)Vishwamitra Research Institute, Center for Uncertain Systems: Tools for Optimization and Management, Clarendon Hills, IL

We propose a real-time optimization framework to integrate water and energy management in power plants. The objective of the framework is to construct optimal bidding curves (power output vs. price) using a first-principles model of the power plant and of the cooling towers under uncertain weather conditions. The weather uncertainty is quantified in the form of ensembles using the state-of-the-art numerical weather prediction model WRF running at Argonne National Laboratory. The ensembles are used for real-time stochastic optimization performed by the BONUS algorithm and coupled to a steady-state power plant model implemented as a CAPEOPEN compliant capability. We analyze the effects of cooling capacity constraints and weather forecasts on the market participation of power plants. We use a pulverized coal power plant case study to demonstrate the potential of the framework.

Safety

Friday, November 11, 2011: 3:00 PM
Tower - Rm 613 (University of Illinois at Chicago)

Description:

An overview of process and environmental safety operations as they relate to Energy

The 1999 Ford Power Plant Explosion and Fire

Friday, November 11, 2011: 3:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Kim Mniszewski, FX Engineering, Inc

The subject explosion and associated loss issues are explored. The incident resulted in 6 deaths and 38 injuries (14 serious) and about $1 billion in property damage involving several buildings in the complex. The cause of the incident relates to a shutdown of boiler #6 and a failed process of purging the natural gas lines to the burners. The incident still ranks as very important, as one of several other gas purge-process incidents have occurred in recent years. Now changes are being made to laws and relevant standards to prevent similar occurrences.

Explosions

Friday, November 11, 2011: 3:30 PM
Tower - Rm 613 (University of Illinois at Chicago)
Ronald Pape, Engineering Systems Inc

This talk is an overview of types of explosions, the effects produced by explosions, and the response of structures to explosion effects. Several recent incidents will be used as examples of different types of explosions. Types of explosions include physical, chemical, electrical and nuclear. Effects include pressure and impulse, thermal effects, fragments, debris and missiles. Pressure effects on structures will be discussed briefly and reference sources provided.

Tales From Life As a Plant Commissioning Engineer, and How the Lessons Learned Can Be Applied to Everyday Plant and Personal Life

Friday, November 11, 2011: 4:00 PM
Tower - Rm 613 (University of Illinois at Chicago)
Mike Moosemiller, Baker Engineering and Risk Consultants, Naperville, IL and **Peter G. Herena**, Baker Risk, IL

In their “prior lives”, the authors participated in a number of new refinery project startups. For a variety of reasons, safety issues crop up more often during startups than in normal operations. Some of the lessons are comic, some tragic, and some just expensive. But all are instructive in one way or the other. This presentation shares some entertaining ‘war stories’, but couples them with some lessons for everyday plant life**.**

YPAB – Sessions

Investing in Your 20s

Thursday, November 10, 2011: 1:00 PM
White Oak A/B (University of Illinois at Chicago)

Description:

True North Retirement Partners of Raymond James will present a 30 minute discussion entitled “Investing in your 20s” and will be concluded with a Q&A session. The discussion will revolve around debt, savings and 401(k) plans. The goal of the discussion will be to give younger professionals a better understanding of how to make wise financial decisions. John Dulay will be the host, and he is a CFA Charterholder with over 10 years experience in the financial services industry. Raymond James & Associates, Inc., Member New York Stock Exchange/SIPC

Chair:
Jessica Swary
Email: jessica.swary@pqcorp.com

Co-Chair:
Meagan Lewis
Email: melewis25@gmail.com

Mathematical Modeling of An F1 Style Engine - Predicting the Torque Curves of New Engines

Thursday, November 10, 2011: 1:45 PM
White Oak A/B (University of Illinois at Chicago)

Description:

Engine simulation is a powerful tool in the research and development of new engine platforms. Within the automotive industry there is an abundance of published knowledge available to build and run these simulations. For racing teams, though, there is an inherent desire to keep knowledge from competitors in order to maintain the competitive edge. Luckily, for the general engine enthusiast there is just enough published information to design a simulation that will roughly predict how powerful these types of engines are. Using some critical information published by Honda in the late 80's, Fiat and Ducati in the 90's, and Ferrari in the early 00's, then combining it with the proposed rule changes for engines in the 2014 F1 season an engine model can be constructed to predict what will hopefully power a very competitive season.

Chair:
Aaron Matthews
Email: aaronmatthews@gmail.com

Panel Discussion - Post Degrees for Chemical Engineers

Thursday, November 10, 2011: 3:00 PM
White Oak A/B (University of Illinois at Chicago)

Description:

A panel discussion on degree and certification opportunities available to Chemical Engineers following undergraduate.

Chair:
Meagan Simantz-Lewis
Email: melewis25@gmail.com

Technical Writing for Engineers

Friday, November 11, 2011: 1:00 PM
White Oak A/B (University of Illinois at Chicago)

Description:

Successful engineers spend about 25% of their work time writing. Although professional engineers have found writing to be their most useful subject in college, job recruiters have suggested that engineers generally need more practice on their writing skills. This session will provide a review of the methodologies and practice behind strong technical writing. Topics will include writing, drafting, revising and finishing as well as the elements of style; structure, language, and illustration. Suggestions will also be provided on writing tasks such as laboratory reports, internal communications and journal articles.

Co-Chair:
Jessica Swary
Email: Jessica.Swary@pqcorp.com

Increasing Your Odds - A Perspective on a More Successful Job Search

Friday, November 11, 2011: 1:45 PM
White Oak A/B (University of Illinois at Chicago)

Description:

In a competitive job market, it may seem like the odds are against you. In fact, there are great opportunities out there, though finding them may require a little resourcefulness. The presentation will focus on exploiting all the tools available to find these opportunities, making the cut with an effective resume, then acing the interview. But it doesn't end there: analyzing multiple offers, negotiating benefits and staying competitive after the acceptance will also be discussed. Experienced professionals will also be encouraged to share their own advice.

Chair:
Jessica Swary
Email: Jessica.Swary@pqcorp.com

Résumé Workshop and Mock Interviews

Friday, November 11, 2011: 3:00 PM
White Oak A/B (University of Illinois at Chicago)

Description:

One-on-one résumé critiques and mock interviews directed by Chicago Young Professionals.

Co-Chair:
Jessica Swary
Email: Jessica.Swary@pqcorp.com

2011 AIChE Midwest Regional Conference
Organizing Committee Members

Symposium Advisory Committee:
Dennis O'Brien (Jacobs Consultancy)
Shannon Brown (Ambitech Engineering Corp.)

2011 Meeting Programming Committee
Chair: Jeffrey Perl (Chicago Chem. Consultants)

Technical Sessions:
Back to Basics – I
Session Chair: Patrick Shannon (Middough)

Refining Energy Updates
Session Chair: Jerry Wilks (Citgo)

University Process Research – I / II / III
Session Chairs: Sohail Murad (University of Illinois at Chicago)
Co-session Chair: Bipin V. Vora, Fuels and Petrochemicals Division/Group 16, UOP (retired)

University Process Research – IV
Session Chair: Donald J. Chmielewski, Department of Chemical and Biological Engineering, Illinois Institute of Technology
Co-session Chair: Bipin V. Vora, Fuels and Petrochemicals Division/Group 16, UOP (retired)

Back to Basics – II
Session Chair: Mike Buettner (Alfa Laval)

Natural Gas
Session Chair: Brian Gahan

Poster Session
Session Chair: Justin Notestein (Northwestern University)

Food in Chicago and Midwest
Session Chair: Jerry Palmer (Ambitech Engineering Corp.)

Water – Energy Issues
Session Chair: Gregory Corda (Nalco)

Specialty Energy Topics - HOW TO
Session Chair: William A. Ryan (University of Illinois at Chicago)

YPAB Session
Session Chair: Jessica Swary (PQ Corporation)
Co-session Chair: Megan Simantz-Lewis (UOP), Aaron Matthews

2011 AIChE Midwest Regional Conference
Organizing Committee Members

2011 General Arrangements Committee
Co-Chairs: Reza Mostofi-Ashtiani / Adam Kanyuh (UOP)

AIChE National Liaison: Joseph Cramer (AIChE), Terri Guttilla (AIChE)

Logistics Sub-Committee Chair: Adam Kanyuh (UOP)

Registration Sub-Committee Chair: Tom King (UOP)

Finance Sub-Committee Chair: Mike Buettner (Alfa Laval)

Fundraising Sub-Committee Chair: Azita Ahmadzadeh

HS Outreach Sub-Committee Chair: Rick Isherwood (UOP)
HS Outreach Sub-Committee: Alan Zagoria (UOP), Megan Simantz-Lewis (UOP), Sarah Shirk (UIC), Gerry Smith (UIC), Stacie Scott (UIC)

Publicity Sub-Committee Chair: Reza Mostofi-Ashtiani (UOP)

Hospitality Sub-Committee Co-Chair: Janet Chu (Middough), DeMarcus Hunter (Middough), Carol Mak (IIIT), Nathan Liebmann (UIC)