

16–18 september 2009

Sheraton Chicago Hotel & Towers



tcbiomass2009
THE INTERNATIONAL CONFERENCE
ON THERMOCHEMICAL CONVERSION SCIENCE

explore the real-world potential of
thermochemical conversion

3 days

25 scientific presentations

50 poster presentations

unlimited networking

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U.S. DEPARTMENT OF
ENERGY



Natural Resources
Canada

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Canada





Welcome to the Future of Biofuels!

Dear Colleague,

With interest in renewable energy sources intensifying, the need for research in the area of thermochemical biomass conversion is quickly moving to the forefront. In fact, with ambitious new renewable fuel standards being set by countries around the world, keeping pace with advances in the field is more urgent than ever.

In 2008, a powerful partnership of Gas Technology Institute (GTI), the U.S. Department of Energy, and CANMET was formed to organize **tcbiomass2009**, a platform for the world's leading scientists and engineers to present research and development innovations that will impact the future of biomass conversion.

As co-chairs, we believe that this unique conference will provide you with a better understanding of the key issues associated with the sustainable production and use of biomass. It will also serve as a unique opportunity for representatives from business and government to work together to meet renewable energy goals.

We look forward to seeing you this September in Chicago, a dynamic international city and a center of technological development in the area of renewable energy.

Vann Bush
Kyriakos Maniatis
Co-Chairs, **tcbiomass2009**



Vann Bush

Vann Bush is Managing Director of GTI R&D programs relating to the conversion of solid fuels into synthesis gas and the cleanup and

re-forming of natural and synthesis gas for use in power, chemicals, and liquid fuels production.



Kyriakos Maniatis

Kyriakos Maniatis is Principal Administrator, Biofuels and Polygeneration, for the Directorate General for Energy & Transport

(DG TREN) of the European Commission. He currently leads European efforts on International Compatible Biofuels Standards.

KEYNOTE PRESENTATIONS

Opening Keynote—Wednesday

Dr. Steven Chu, U.S. Secretary of Energy (invited)

"The Role of Thermoconversion in the DOE Vision for Biomass Utilization"

Thursday Keynote

Jim Frederick, Thermochemical Program Lead, National Renewable Energy Laboratory (NREL)

"Advanced Transportation Fuels via Gasification and Pyrolysis of Lignocellulosic Biomass—NREL's Vision"

Friday Keynote

Ralph Overend, Former NREL Research Fellow, editor of *Biomass and Bioenergy*

"Bioenergy in Canada"

AWARD RECIPIENT

Tony Bridgwater— a Thermochemical Pioneer



Tony Bridgwater, Professor of Chemical Engineering at Aston University in Birmingham, England, and a leading bioenergy researcher, will be presented with the Don Klass Award for Excellence in Thermochemical Conversion Science. The award recognizes his extensive contributions to the field and his past efforts as organizer of World Biomass Conferences. Dr. Bridgwater is the founder of PyNe, or Pyrolysis Network, a global forum for researchers in fast pyrolysis of biomass to exchange information on new scientific and technological developments on biomass pyrolysis and related technologies.

Join Us at the Cutting Edge of Thermochemical Biomass Conversion Science!

Thermochemical conversion is now recognized as an important platform for the production of biomass-derived fuels for renewable and sustainable energy. **tcbiomass2009** is a global forum that focuses on this important area of science.



A truly historic event, the conference will offer a unique look at the latest breakthrough research with:

- 25 scientific presentations and 50 posters by many of the world's leading researchers in gasification, pyrolysis, and pyrolysis oil upgrading and pretreatment
 - panel discussions led by experts from industry, research, and government that will explore the implications and possibilities offered by biofuel technology.
- Who will be there:**
- leading researchers
 - technology developers
 - investors in emerging technology
 - engineering companies
 - feedstock suppliers, and
 - government bioenergy program leaders

Technical Program Committee

Suresh Babu

Gasification Session Chair

Dr. Babu has more than 36 years of alternative energy RD&D experience. He served in various capacities for more than 30 years at GTI and, for the last 20 years, he has led the Thermal Gasification of Biomass activities for the International Energy Agency (IEA) and U.S. Department of Energy.

Reinhard Rauch

Gasification Session Chair

Dr. Rauch is a Senior Researcher in the field of fluidized bed gasification at Vienna University of Technology. He has extensive experience in operating dual fluidized bed gasifiers, including all necessary measurement and analytical methods.

Visit www.gastechnology.org/tcbiomass2009 for up-to-the-minute information about keynote presentations and scientific sessions.

John Scahill

Pyrolysis Session Chair

Since 2004, John Scahill has served as a Project Manager with the U.S. Department of Energy's Golden Field Office, where he manages a portfolio of more than 30 biomass-related research and development projects for the Office of Biomass Program.

Robert Brown

Pyrolysis Session Chair

Dr. Brown is Anson Marston Distinguished Professor in Engineering and Gary and Donna Hoover Chair in Mechanical Engineering at Iowa State University. The author of *Biorenewable Resources: Engineering New Products from Agriculture*, he helped to establish the first U.S. graduate program offering degrees in biorenewable resources.

Douglas Elliott

Upgrading and Pretreatment Session Chair

Douglas Elliott has more than 30 years of research and project management in the Battelle system at the Pacific Northwest National Laboratory (PNNL). The main focus of his work has been on the development of fuels and chemicals from biomass and waste.

2009 International Conference on Thermochemical Biomass Conversion Science—Meeting At-A-Glance

| | 7:00 a.m. | 8:00 a.m. | 9:00 a.m. | 10:00 a.m. | 11:00 a.m. | 12:00 | 1:00 p.m. |
|------------------|-------------------|-----------------------|-----------|------------------------------------|------------|---------------------------|-------------------------|
| Tuesday | | | | | | | |
| 15-September | | | | | | | |
| Wednesday | Registration Open | | | | | | |
| 16-September | | Continental Breakfast | Keynote | Gasification Session I | | Lunch | Gasification Session II |
| Thursday | Registration Open | | | | | | |
| 17-September | | Continental Breakfast | Keynote | Pyrolysis Session I | | Lunch | Pyrolysis Session II |
| Friday | Registration Open | | | | | | |
| 18-September | | Continental Breakfast | Keynote | Upgrading and Pretreatment Session | | Panel Discussion | Wrap Up |
| | | | | | | Buses Depart for GTI Tour | GTI Rese |

Wednesday, 16 September

8:30 a.m. – 9:00 a.m.

Keynote—The Role of Thermochemical Conversion in the U.S. DOE Vision for Biomass Utilization

U.S. Secretary of Energy (invited)

Gasification Session I

Session Chair: Suresh Babu, GTI

9:00 a.m. – 10:30 a.m.

Technoeconomics of the Production of Mixed Alcohols via High-Temperature Gasification

Abhijit Dutta, Richard Bain and Mary Biddu, National Renewable Energy Laboratory (NREL)

Tar Reforming and Ammonia Decomposition Enabling Technology for Thermochemical Biomass Conversion

John Bøgild Hansen, Poul Erik Højlund Nielsen, and Niklas Bengt Jakobsen, Haldor Topsøe, Denmark

Fluidized-Bed Gasification of Biomass for Syngas Applications: Comparison of Gasification Process Alternatives

Esa Kurkela and Minna Kurkela, VTT Technical Research Centre of Finland

10:30 a.m. – 10:45 a.m. Break

10:45 a.m. – 11:45 a.m.

Biomass to Liquids: The Backbone of UPM-Kymmene's Biofuel Initiative

Pekka Jokela, UPM-Kymmene Corporation; and Andras Horvath, Carbona, Inc., Finland

Comparison of Tar Content and Composition in Steam Gasification and Pressurized Air Gasification of Wood

Ute Wolfesberger, Isabela Aigner, and H. Hofbauer, Vienna University of Technology (TUW), Austria

11:45 a.m. – 12:45 p.m. Lunch

Gasification Session II

Session Chair: Reinhard Rauch, Vienna University of Technology

12:45 p.m. – 3:30 p.m.

The Development of a Gas Cleanup Process: Lessons Learned

Pekka Simell, Esa Kurkela, Ilkka Haavisto, and Jukka Järvenpää, VTT Technical Research Centre of Finland

Robust Glass-Ceramics Catalysts for Decomposing Tars Produced in Fluid-Bed Biomass Gasification

Larry Felix, Chun W. Choi, David M. Rue, Logan E. Weast, Gas Technology Institute (GTI), and Thomas P. Seward III, TPS Consulting

Biomass Gasification Tar Cracking Technology Development

D.C. Dayton and R. Gupta, RTI International

OLGA: Flexible Tar Removal for High-Efficient Production of Clean Heat and Power As Well As Sustainable Fuels and Chemicals

R.W.R. Zwart and A. van der Drift, Energy Research Centre of the Netherlands (ECN)

Spatially Resolved Measurements of Gas Composition in a Pressurized Black Liquor Gasifier

Rikard Gebart, Per Carlsson, Magnus Marklund, Henrik Wiinikka, and Olov Öhrman, Energy Technology Center, Sweden, and Mikael Risberg, Luleå University of Technology

Chemrec's BL Gasification Plant Operations and Plans

Ingvar Landälv, Mats Lindblom, and Patrik Löwnertz, Chemrec AB, Sweden

3:30 p.m. – 3:45 p.m. Break

Gasification Panel Discussion

3:45 p.m. – 4:30 p.m.

Moderator: Suresh Babu, GTI

Panelists: Richard Bain, NREL; Bram Van der Drift, ECN; Reinhard Rauch, Vienna University of Technology (TUWien); Andras Horvath, Carbona, Inc.; Craig Brown, Catchlight Energy; Esa Kurkela, VTT Technical Research Centre of Finland

Poster Sessions

4:30 p.m. – 6:00 p.m.

Thursday, 17 September

8:30 a.m. – 9:00 a.m.

Keynote—Advanced Transportation Fuels via Gasification and Pyrolysis of Lignocellulosic Biomass: NREL's Vision

Jim Frederick, National Renewable Energy Laboratory (NREL)

Pyrolysis Session I

Session Chair: Robert Brown, Iowa State University

9:00 a.m. – 10:30 a.m.

Life-Cycle Assessment of the Biomass-To-Oil (BTO) Process with Combined Heat and Power (CHP) Generation

Dietrich Meier, Johann Henrich von Thunen-Institute (vTI) Institute of Wood Technology and Wood Biology, Axel Faix and Gero Becker, Albert-Ludwigs-Universität, Jörg Schweinle, Johann Henrich von Thunen-Institute (vTI) Institute of Forest Based Sector Economics, and Stefan Schöll, PYTEC Thermochemische Anlagen GmbH

experience the energy

| | | | | | | | |
|-----------|-------------------|------------------|-----------------|-----------------------|----------------------------|---|-----------|
| 2:00 p.m. | 3:00 p.m. | 4:00 p.m. | 5:00 p.m. | 6:00 p.m. | 7:00 p.m. | 8:00 p.m. | 9:00 p.m. |
| | Registration Open | | | | | | |
| | | | | Welcome Reception | | | |
| | | | | | | | |
| | | Panel Discussion | Poster Sessions | Shuttles to Navy Pier | Boarding for Dinner Cruise | Reception and Dinner Cruise on <i>Spirit of Chicago</i> | |
| | | | | | | | |
| | | Panel Discussion | Poster Sessions | | | | |

Research Lab Tour

tcbiomass2009 features presentations by many of the world's leading researchers in gasification, pyrolysis, and pyrolysis oil upgrading and pretreatment. The conference will comprise three days of scientific presentations and posters, with many opportunities to consult and network with experts and colleagues.

Envergent Biofuel Technology and Life Cycle Assessment

Geoff Hopkins and Mark Reno, Envergent Technologies LLC; Tom Kalnes, UOP LLC; and David Shonnard, Michigan Technical University

Quality Control in Fast Pyrolysis Bio-Oil Production and Use

Anja Oasmaa, VTT Energy Fuel Processing Laboratory; Douglas Elliott, Pacific Northwest National Laboratory (PNNL); and Stefan Müller, Ensyn Corporation

10:30 a.m. – 10:45 a.m. Break

10:45 a.m. – 11:45 a.m.

What Does It Mean to Characterize Bio-Oil?

Robert C. Brown, Marge Rover, Najeeb Kushyill, Pat Johnston, and Sam Jones; Iowa State University

Biocarbon Production: The State of the ART
Michael Jerry Antal, Jr., University of Hawaii at Manoa

11:45 a.m. – 12:45 p.m. Lunch

Pyrolysis Session II

Session Chair: John Scahill, U.S. Department of Energy

12:45 p.m. – 3:15 p.m.

A Mobile Pyrolyzer for the Conversion of Biomass into Bio-Oil

Cedric Briens, Franco Berruti, and Lorenzo Ferrante, University of Western Ontario, Institute for Chemicals and Fuels from Alternative Resources (ICFAR)

Comparison of Fast Pyrolysis Bio-Oils from Agricultural Feedstocks: Woods, Grasses, and Legumes

Charles A. Mullen and Akwasi A. Boateng, U.S. Department of Agriculture, Agricultural Research Service, Eastern Regional Research Center

Evaporation of Biomass Fast Pyrolysis Oil: Evaluation of Char Formation

R.P. Balegedde Ramachandran, G. van Rossum, S.R.A. Kersten, W.P.M. van Swaaij, University of Twente, Netherlands

Py-GC/MS Studies to Evaluate Biomass Pretreatment Strategies to Enhance the Production of Anhydrosugars from Fast Pyrolysis

Manuel Garcia-Perez, Robert Lee Johnson and Shi-shen Liaw, Washington State University

Bench-Scale Fluidized-Bed Fast Pyrolysis of Peanut Shell for Bio-Oil Production

Ruiqin Zhang, Changsen Zhang and Wen Shi, Zhengzhou University, Xipeng Li, Yaowei Li, and Jinbin Xiao, Kaifeng Rundi Biomass Energy Company Ltd.

3:15 p.m. – 3:30 p.m. Break

Pyrolysis Panel Discussion

3:30 p.m. – 4:30 p.m.

Moderator: John Scahill, U.S. Department of Energy

Panelists: Tony Bridgwater, Aston University; Jani Lehto, Metso; Geoff Hopkins, Envergent Technologies; Dietrich Meier, Pytech; Akwasi Boateng, U.S.D.A.; Franco Berruti, University of Western Ontario

Poster Sessions

4:30 p.m. – 6:00 p.m.

Friday, 18 September

8:00 a.m. – 8:30 a.m.

Keynote—Bioenergy in Canada

Ralph Overend, former NREL research fellow

Upgrading and Pretreatment Session

Session Chair: Douglas Elliott, Pacific Northwest National Laboratory (PNNL)

8:30 a.m. – 11:00 a.m.

Catalytic Hydroprocessing of Biomass Fast Pyrolysis Bio-Oil to Produce Hydrocarbon Products

Douglas C. Elliott, Todd R. Hart, Gary G. Neuenschwander, Leslie J. Rotness, Alan H. Zacher, Pacific Northwest National Laboratory (PNNL)

Mild Catalytic Hydrotreating of Biomass Pyrolysis Oils to Produce a Suitable Refinery Feedstock

Richard French, National Renewable Energy Laboratory (NREL)

Lignin Valorisation for Chemicals and (Transportation) Fuels Via (Catalytic) Pyrolysis and Hydrodeoxygenation

Paul J. de Wild and R. van der Laan, Energy Research Centre of the Netherlands (ECN); A. Kloekhorst and E. Heeres, Rijksuniversiteit Groningen (RUG), The Netherlands

Integrated, Fast Hydropyrolysis and Hydroconversion Process for Production of Gasoline and Diesel Fuel from Biomass

Terry Marker, Larry Felix, and Martin Linck, Gas Technology Institute (GTI)

Improvements of Biomass Physical and Thermochemical Characteristics via Torrefaction Process

Samy Sadaka and Sunita Negi, University of Arkansas

11:00 a.m. – 11:15 a.m. Break

Upgrading and Pretreatment Panel Discussion

11:15 a.m. – 11:45 a.m.

Moderator: Douglas Elliott, Pacific Northwest National Laboratory (PNNL)

Panelists: Philip Steele, Mississippi State University; Randy Cortwright, Virent; Robert Baldwin, National Renewable Energy Laboratory (NREL); Kees Hogendoorn, BIOCOUP; Paul O'Connor, KiOR, Inc.

embrace the future

Panel Discussions

Leading international experts on gasification, pyrolysis, and upgrading and pretreatment will moderate panels on their respective topics on Wednesday,

Thursday, and Friday. These discussions will provide insights on some of the cutting-edge research that is happening all over the world.



Dr. Suresh Babu



Dr. Reinhard Rauch



John Scahill



Dr. Robert Brown



Douglas Elliott



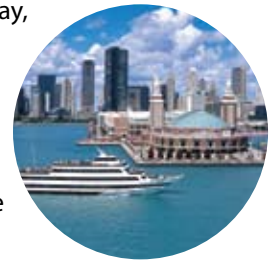
Poster Sessions

At the two dedicated poster sessions, you'll have opportunities to engage in one-on-one technology discussions with over 50 presenters—and learn about the work they're doing to develop innovative solutions.

Be Sure to Make These Special Events a Part of Your **tcbiomass2009** Experience!

Take advantage of special networking opportunities.

Kick off your **tcbiomass2009** experience in a relaxing social environment at the Welcome Reception at the beautiful Sheraton Chicago Hotel & Towers. You'll have a chance to catch up with colleagues and network with the experts before the sessions begin. Then, on Wednesday, plan to join us at a special dinner cruise on board the popular Spirit of Chicago yacht. We'll be honoring Tony Bridgwater with the Don Klass Award for Excellence in Thermochemical Conversion Science. And you'll have another great chance to exchange knowledge and experiences with your peers!



Take a Tour of GTI research facilities.

You're invited to join a special tour on Friday following the Conference wrapup. While on the tour, you'll see GTI's Flex-Fuel Test Facility, Advanced Gasification Test Facility, and other laboratories conducting progressive research, development, and deployment. This is where researchers at GTI are evaluating innovative gasification and pyrolysis processes in support of commercialization of advanced gasification and downstream end-use technologies.



Hotel Accommodations

tcbiomass2009 will be held at the Sheraton Chicago Hotel & Towers, 301 E. North Water Street, Chicago. Rooms for **tcbiomass2009** attendees are at a special rate of \$209/night, single or double occupancy (plus applicable taxes). Government rates may be available, check with the hotel directly for details. To reserve a room, contact Sheraton reservations at 800-325-3535; if outside North America, call the hotel direct at 312-464-1000, and reference the conference code of **tcbiomass2009**. Rooms may also be reserved online through: <http://www.starwoodmeeting.com/Book/BIOMASS2009>. Reservations should be made as soon as possible, but no later than August 15. After that date, or when the block is filled if before August 15, the block will be released with reservations accepted on an availability basis only at the hotel's prevailing rate.



Delegate Registration

tcbiomass2009: the international conference on thermochemical conversion science
16–18 september 2009 • sheraton chicago hotel & towers

Please print or type.

To register additional attendees, copy this form and submit a separate form for each registrant.

Mr. Ms. Mrs. Dr. Prof. Other _____ First name for badge _____

First Name _____ Initial _____ Last Name _____

Organization _____

Title _____

Address _____

City _____ State/Province _____ ZIP/Postal Code _____

Country _____

Phone _____ Fax _____

E-Mail _____

Emergency Contact

In case of an emergency during the conference, please contact:

Name _____

Daytime Phone _____

Evening Phone _____

Payment Summary

Full time students and U.S. Department of Energy employees, please call +1-847-768-0940 for special pricing and registration information.

| Delegate Registration | |
|---|----|
| \$1295 paid by 1 August 2009 | \$ |
| \$1495 paid 2 August until 9 September 2009 | \$ |
| \$1695 as of 10 September 2009 and On-Site | \$ |

Student Registration—Special low rate information available online!

| Guest Registration | |
|--|--------------------------|
| A guest is a spouse, family member, or friend who is not in an industry-related occupation. A guest registration may not be used by a co-worker or an associate within the industry. | |
| Name for badge _____ | |
| Indicate which events your guest will attend: | |
| Tuesday 15 September: Welcome Reception \$50 U.S. | <input type="checkbox"/> |
| Wednesday 16 September: Dinner Cruise \$100 U.S. | <input type="checkbox"/> |
| Thursday 17 September: GTI Tour (no fee) | <input type="checkbox"/> |
| Grand Total | \$ |

Special Needs

If you have special needs that may require accommodations, please contact
sandy.hagen@gastechnology.org

Method of Payment

Please mail registration and payment to:
Gas Technology Institute
tcbiomass2009
1700 South Mount Prospect Road
Des Plaines, IL 60018

Registrations with credit card payments may be mailed to the address above, faxed to +1-847-768-0858 or e-mailed to tcbiomass2009@gastechnology.org

Checks or money orders.

Payment accepted in U.S. dollars only.

Checks made payable to Gas Technology Institute (personal checks will be accepted only if drawn on U.S. banks). Name of registrant and "tcbiomass2009" must be indicated on all checks and money orders.

I am enclosing a check or money order for \$ _____

Check or money order # _____

Credit cards

Payment accepted in U.S. dollars only.

MasterCard Visa American Express

Card No. _____

Expiration Date _____

V-Code Security Number _____

(3-digit number printed on the signature panel on the back of Visa or MasterCard or 4-digit number printed above account number on the front of American Express cards)

Cardholder Name _____

Signature _____

Registrations not accompanied by payment will not be processed.

Cancellation Policy:

All cancellations must be received in writing. Delegates will receive a full refund of the registration fee if we receive your cancellation by 14 August 2009, or a refund of the registration fee, less a \$100 processing fee, for cancellations received between 15 August and 9 September 2009. NO REFUNDS WILL BE ISSUED after 10 September 2009; however, a substitute delegate may attend the conference. Guests will receive a full refund of the guest registration fee if we receive your cancellation by 1 September 2009. NO REFUNDS WILL BE ISSUED after 2 September; however, a substitute guest may attend the event(s) paid for and listed above. Fax cancellation information to +1-847-768-0858 or e-mail to tcbiomass2009@gastechnology.org

Conference Events Registration

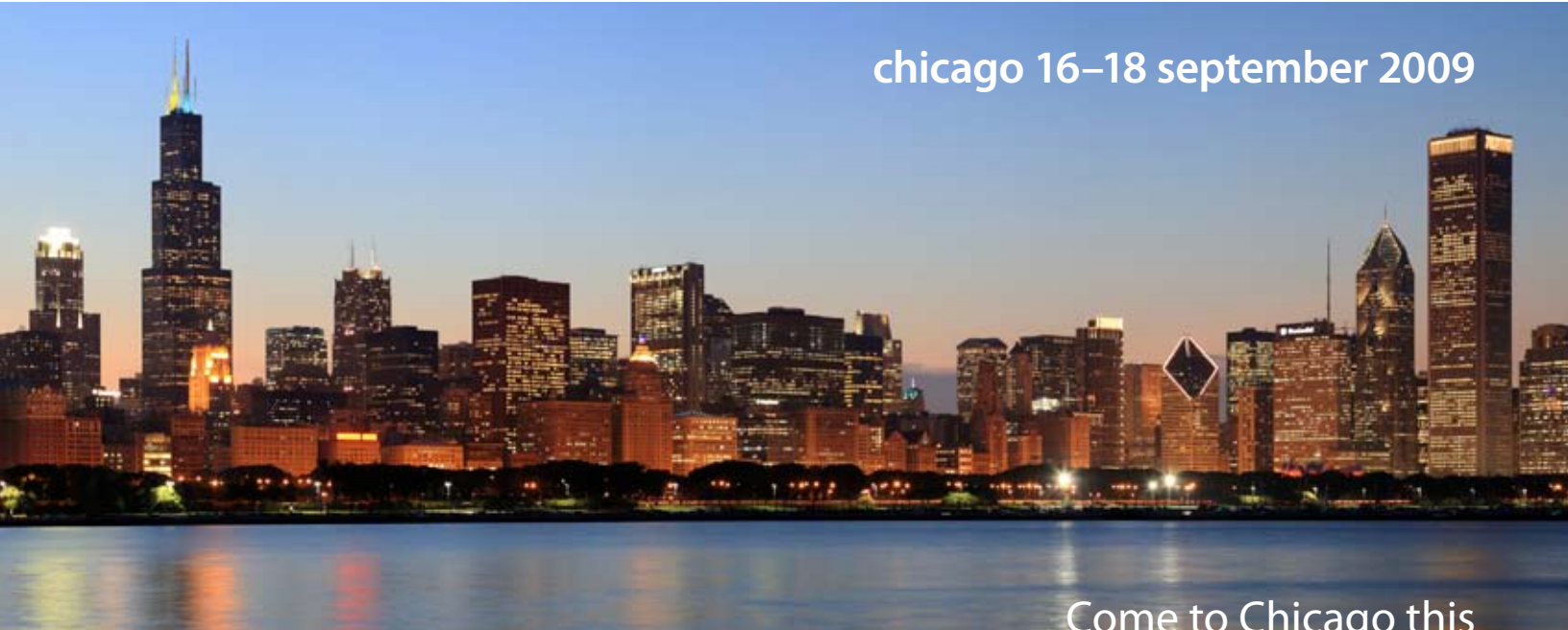
Please indicate with a checkmark (✓) which events you plan to attend.

| | Luncheon | Welcome Reception | Dinner Cruise | GTI Tour |
|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Tuesday 15 September | | <input type="checkbox"/> | | |
| Wednesday 16 September | <input type="checkbox"/> | | <input type="checkbox"/> | |
| Thursday 17 September | <input type="checkbox"/> | | | |
| Friday 18 September | | | | <input type="checkbox"/> |



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chicago 16–18 september 2009

Attend *the* global scientific forum on the state of the art and future of thermochemical biomass conversion science, where we'll be discussing:

- Biomass Gasification
- Biomass Pyrolysis
- Upgrading and Pretreatment

Come to Chicago this September and see the future of bioenergy!



gastechnology.org/tcbiomass2009

