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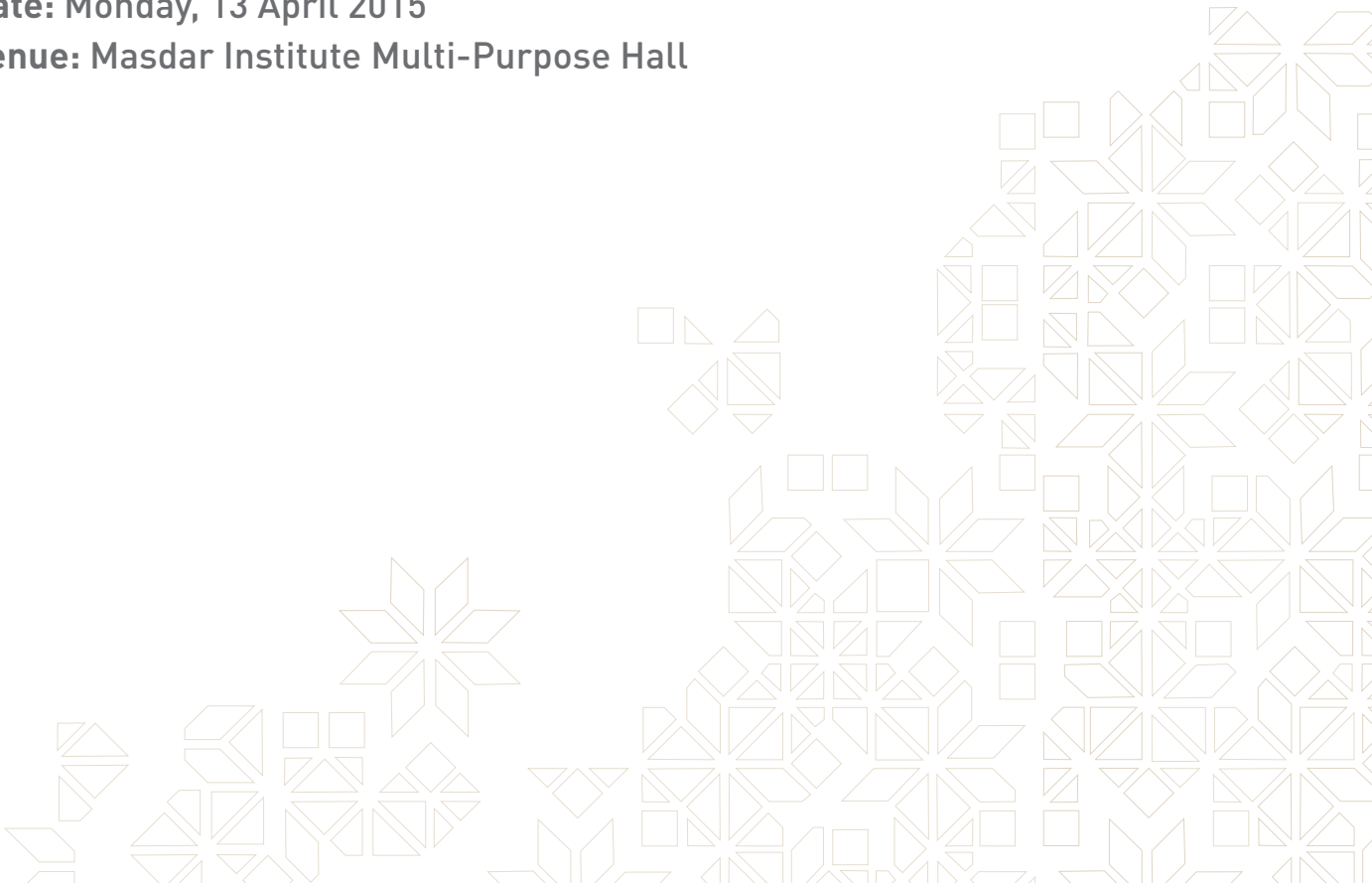


# Masdar Institute and MIT

## Research and Innovation Conference

**Date:** Monday, 13 April 2015

**Venue:** Masdar Institute Multi-Purpose Hall





## Synopsis

The Masdar Institute and MIT Research and Innovation Conference highlights technology-based, innovative joint research that aligns with the goals of the UAE's new National Innovation Strategy. Participants will gain insights into both current research and the strategic directions MIT and Masdar Institute are taking to meet future challenges.



# Background and Objective

Masdar Institute and MIT will present summaries of ongoing collaborative research in priority sectors including renewable energy, water and climate, critical infrastructure, and advanced technologies. Such research is expected to contribute to accelerated innovation and industrial development in several of the sectors targeted in the National Innovation Strategy.

Masdar Institute of Science and Technology is the world's first graduate-level university dedicated to providing real-world solutions to issues of sustainability.

Located in Masdar City in Abu Dhabi, the capital of the United Arab Emirates, Masdar Institute is supporting Abu Dhabi's economic diversification by nurturing highly-skilled human and intellectual capital and partnering with industry leaders. The Institute, in collaboration with the Massachusetts Institute of Technology (MIT) is helping the Emirate in its transformation to a knowledge-based economy and in enhancing its position as a leader in global energy.

The Masdar Institute campus is powered by renewable energy and supported by the cutting edge of technology, providing students with a unique opportunity to live and learn in a true "living laboratory" environment.

Within its campus, Masdar Institute is establishing an educational environment, a culture of R&D excellence, and ties with government and industry that are essential to fostering indigenous innovation, human capital and knowledge development, and a spirit of entrepreneurship and global competitiveness.

# Context

In the fall of 2014, HH Sheikh Mohammed bin Rashid Al Maktoum, UAE Vice President, Prime Minister and Ruler of Dubai, launched the National Innovation Strategy to sustain the UAE's leading position in the region and realize its ambition of becoming one of the most innovative nations in the world.

The strategy identifies seven innovation priority sectors: renewable and clean energy, water, health, education, transportation, space, and technology (e.g. ICT and microelectronics).

Stakeholders who can serve as innovation champions are invited to initiate new projects within these sectors. The strategy also draws attention to the importance of an innovation-enabling environment.

Masdar Institute, in collaboration with MIT, seeks to support this crucial UAE initiative by addressing technology-based innovation. Here the word "technology" is used in its broadest sense, to include all high technology rather than just ICT-based technology.

Technology-based innovation leads to the development of new products and services, even new industries, and is a vital part of knowledge-based economies. It is qualitatively different from other forms of innovation, for reasons that include the ability to scale technology-based products and services internationally, providing global marketing and export opportunities; the ability to capture many of the benefits of innovation through patenting and other forms of intellectual property protection; and its dependence on, and creation of jobs for, highly-educated, highly-skilled workers.



# Desired Outcomes

Technology-based innovation is a key component of the National Innovation Strategy in each of the seven priority sectors. Such innovation is taking place today in the UAE.

Masdar Institute, working with MIT, integrates theory and practice to incubate a culture of innovation and entrepreneurship, working to develop the critical thinkers and leaders of tomorrow.

MIT's Innovation Initiative and that of Masdar Institute are Institute-wide initiatives to transform the innovation ecosystems of both universities — internally, around the globe and with its partners — for accelerated impact well into the 21st century.

This conference will feature discussion on the following key questions in an effort to bring awareness and highlight the need for a concerted integrated strategy to advance the timeline from experiment, to lab, to the general public.

1. What key research strategies are being pursued at MIT and Masdar Institute?
2. How do these strategies support the UAE's National Innovation Strategy?
3. What avenues of research in Energy, Water, and other focus areas are being pursued today?
4. What are the best practices to move technologies from the lab into the world?



# Program Agenda

## Masdar Institute and MIT Research and Innovation Conference

09:00-09:30 am

**Registration, Coffee and Networking**

**Welcome by Master of Ceremonies**

09:30-09:45 am

**Opening Remarks**

**Dr. Fred Moavenzadeh**, President of Masdar Institute

### **Masdar Institute and MIT Innovative Research – What is on the Horizon?**

09:45-10:10 am

**Emerging Nano-Technologies at MIT**

**Dr. Vladimir Bulovic**, Associate Dean for Innovation, Professor,  
Electrical Engineering and Computer Science Department, MITMIT

10:10-10:25 am

**Masdar Institute's Research Strategy and the UAE National  
Innovation Strategy**

**Dr. Steve Griffiths**, Executive Director of Institute Initiatives,  
Masdar Institute

10:25-10:35 am

**Overview of the Collaborative Research Conference**

**Dr. Duane Boning**, Director, MIT & Masdar Institute Cooperative  
Program (MIT&MICP) , Professor, Department of Electrical  
Engineering and Computer Science, MIT

10:35-10:50 am

**Water and Food Research at MIT**

**Dr. John Lienhard**, Abdul Latif Jameel Professor,  
Department of Mechanical Engineering, MIT

10:50-11:00 am

**Break**



## Overview of Research Collaboration in Clean and Renewable Energy

- 11:00-11:20 am **Advanced Thermal Energy Storage System Directly Charged by Concentrated Solar Power**  
**Dr. Nicolas Calvet**, Assistant Professor, Department of Mechanical and Materials Engineering, Masdar Institute
- 11:20-11:40 am **Biorefinery: Integrated Sustainable Processes for Biomass Conversion to Biomaterials, Biofuels, and Fertilizer**  
**Dr. Jens Ebye Schmidt**, Head of Institute Center for Energy, Professor, Department of Chemical and Environmental Engineering, Masdar Institute
- 11:40-12:00 pm **Ultimate Solar: High Efficiency, Multi-Junction Si-Based Cells and Optical Concentrators**  
**Dr. Eugene Fitzgerald**, SMA Professor, Department of Materials Science and Engineering, MIT
- 12:00-12:20 pm **High Performance Compact Solar Thermal Power and Cooling System**  
**Dr. TieJun (TJ) Zhang**, Assistant Professor, Department of Mechanical and Materials Engineering, Masdar Institute
- 12:20-12:40 pm **Full Spectrum Solar Energy Water Splitting for Storable Fuel Generation**  
**Dr. Sang-Gook Kim**, Professor, Department of Mechanical Engineering, MIT
- 12:40-01:40 pm **Lunch**

# Program Agenda

Masdar Institute and MIT Research and Innovation Conference

## A Steady Stream of Water Innovation

- 01:40-02:00 pm **Climate, Water, Health and the Environment in Arid Regions**  
**Dr. Elfatih Eltahir**, Associate Department Head, Civil and Environmental Engineering, MIT
- 02:00-02:20 pm **Development of Advanced Membrane Water Purification Systems: Fabrication, Fouling Resistance, and System Configuration**  
**Dr. Hassan Arafat**, Associate Professor, Department of Chemical and Environmental Engineering, Masdar Institute

## Delivering the Next Generation of Technology Projects

- 02:20-02:40 pm **Information and Decision Architectures for Robustness, Resilience and Risk Mitigation in Future Power Grids**  
**Dr. Munther Dahleh**, W Coolidge Professor, Department of Electrical Engineering and Computer Science, MIT  
Acting Director of the Engineering Systems Division, MIT
- 02:40-03:00 pm **Development of Advanced Microclimate & Urban Energy Analysis Modeling Environment & Its Validation by Wide Area Sensor Networks & Remote Sensing for Future Adaptation of Urban Infrastructure**  
**Dr. Afshin Afshari**, Professor, Engineering Systems and Management, Madar Institute

- 03:00-03:10 pm **Break**

## Making Joint Innovation a Reality

03:10-03:25 pm

### **Masdar Institute's Center for Innovation and Entrepreneurship**

**Dr. Bruce Walker Ferguson**, Head of Institute Center for Innovation and Entrepreneurship, Masdar Institute and Professor of the Practice, Department of Engineering Systems Management, Masdar Institute

## Driving Innovation Forward

03:25-03:40 pm

### **Wastewater Treatment Using Novel Integrated Technology Based on Bio-Electrochemical and Nanowire Filtration**

**Dr. Shadi Wajih Hasan**, Assistant Professor Department of Chemical and Environmental Engineering, Masdar Institute

03:40-03:55 pm

### **Novel Module Configurations for High Efficiency Membrane Distillation**

**Dr. John Lienhard**, Abdul Latif Jameel Professor, Department of Mechanical Engineering, MIT

03:55-04:10 pm

### **Low Cost Rapid Algal Bloom Sensing Device**

**Dr. Anuradha Murthy Agarwal**, Principal Research Scientist, Materials Processing Center, MIT

04:10-04:25 pm.

### **GaN High Efficiency Transmitters for Wireless Communication**

**Dr. Tomas Palacios**, Associate Professor, Department of Electrical Engineering and Computer Science, MIT

04:25-04:30 pm

### **Closing Remarks**

**Dr. Duane Boning**, Director, MIT & Masdar Institute Cooperative Program, Professor, Department of Electrical Engineering and Computer Science, MIT

# Program Agenda

## Masdar Institute and MIT Research and Innovation Conference

04:30-05:30 pm

### **Reception and Networking**

Taking place in the lobby outside the main conference room, innovators will be present during this networking session to meet and discuss ideas with attendees.

### **Innovation Pavilion: Promising UAE-Developed Technologies**

**Host: Dr. Bruce Walker Ferguson**, Head of Institute Center for Innovation and Entrepreneurship, Masdar Institute and Professor of the Practice, Department of Engineering Systems Management, Masdar Institute

The Innovation Zone is a unique feature highlighting promising new research through poster presentations and providing attendees an opportunity to engage with other leaders from the UAE's innovation ecosystem, from the knowledge creators to venture capitalists, entrepreneurs, and innovative corporate leaders.

The projects on display include innovations in energy, water and microelectronics from Masdar Institute and MIT, including hot ideas from Masdar Institute's leading labs on their way to commercialization. The Innovation Zone provides an unstructured opportunity to put a "human face" on technology innovation and talent and gives attendees the chance to be among the first to find out about upcoming technologies that will change the way we live and work.







