Fact Sheet

About Masdar Institute

- Masdar Institute of Science and Technology was established by the government of Abu Dhabi as an independent, non-profit, research-driven graduate university dedicated to higher education and research in advanced energy and sustainable technologies.

- Masdar Institute was developed with the support and cooperation of the Massachusetts Institute of Technology (MIT), and currently operates in close on-going collaboration with MIT to develop research and development (R&D) capacity in Abu Dhabi that addresses issues of importance to the UAE and the region.

- Located in Abu Dhabi, the capital of the United Arab Emirates, Masdar Institute aims to support the Emirate's economic diversification by nurturing highly-skilled human and intellectual capital, and partnering with industry leaders to help the Emirate transform to a knowledge-based economy as per the Economic Vision 2030.

- The Institute serves as source of innovation and human capital for the region providing qualified students with the opportunity to pursue graduate studies and research in critical areas such as renewable energy, sustainability, environment, water resources, engineering systems and management, advanced materials, etc.

- Masdar Institute focuses on complex real-world problems that require a multidisciplinary approach for the development of solutions from an integrated technology, systems and policy perspective.

Objectives

- To be recognized as a world-class graduate research university focused on advanced energy and sustainable technologies;

- To provide cutting-edge research and graduate education;

- To develop human capacity in clean energy and sustainable technology;

- To foster the development of a diversified knowledge-based economy;

- To incubate a culture of innovation and entrepreneurship;

- To help position Abu Dhabi on the world map as a leader in science and technology.

Academic Programs

Masdar Institute offers Master of Science degree programs and an interdisciplinary PhD program based on the US graduate education model:

- MSc Electrical Power Engineering

- MSc Engineering Systems and Management
- MSc Computing and Information Science
- MSc Materials Science and Engineering
- MSc Mechanical Engineering
- MSc Microsystems Engineering
- MSc Water and Environmental Engineering
- MSc Chemical Engineering
- PhD in Interdisciplinary Engineering

Practicing Professionals

- Working professionals are allowed to enrol in any of the eight master's programs on offer on a part-time basis without leaving their jobs;

- Practicing professionals must meet the same admission and course requirements as regular full-time students;

- Unlike full-time students, working professionals are required to pay tuition fee.

Admissions*

- A relevant undergraduate/master's degree in Science or Engineering from a recognized and accredited university;
- A minimum CGPA of 3.0 (on a 4.0 point scale) or equivalent for master's applicants and 3.2 for PhD applicants;
- A TOEFL score of 577 for paper-based, 233 for computer-based, 91 for internet-based; or an IELTS score of 6.5 and above;
- A competitive GRE score* with no less than 155 (700 on the old scale) on the Quantitative section;
- Statement of objectives;
- 3 letters of recommendation.

**** The above criteria are the minimum requirements and are no guarantee of admission.***

Note: *Highly-qualified applicants who lack the required GRE score may be granted conditional admission, and are therefore required to pass placement exams or complete additional coursework prior to full admission to the program.*

Scholarships

- Qualified Students admitted to Masdar Institute as full-time students are offered a full scholarship including:

  - 100% tuition
  - Textbooks
  - Laptop

- Accommodation
- Medical insurance
- Annual travel expenses
- Cost-of-living stipend

Research

- The research focus at Masdar Institute addresses real-world energy and sustainability challenges from an integrated technology, systems and policy perspective;

- Faculty and students are dedicated to pursuing research that will meet the economic and developmental needs of not only Abu Dhabi and the UAE, but also the world at large;

- Masdar Institute takes a multidisciplinary approach to research that includes the following major themes:

    - Water, Environment and Health
    - Energy Systems
    - Microsystems and Advanced Materials

- A large number of research projects are additionally undertaken by Masdar Institute faculty and students on topics including solar energy technologies, bioenergy, smart grids and smart buildings, electricity grids, water desalination, advanced electronic devices and integrated circuit systems, etc.

Research Centers

Masdar Institute has established the following research centers in core topical areas to address major challenges in advanced energy and sustainability:

- Research Center for Renewable Energy Mapping and Assessment
- Sustainable Bio-energy Research Consortium
- TwinLab 3D Stacked Chips Research Center
- TwinLab on MEMS technologies

Collaborations

Masdar Institute seeks to engage external partners from industry, government, and other academic institutions in collaborative partnerships.

- A*STAR Institute of Microelectronics (IME), GLOBALFOUNDRIES Singapore Pte. Ltd. and Masdar Institute) entered into a collaboration to develop and advance micro-electro-mechanical systems (MEMS) technologies for automotive, aerospace, consumer, healthcare, industrial, and mobility applications. The Abu Dhabi-Singapore Twin Lab will focus on the development of MEMS technologies including inertial sensors, energy harvesters, nano-opto-mechanical sensors, and ultrasonic

transducers.

- The ‘ATIC Cleanroom at Masdar Institute’ became fully operational, significantly enhancing Abu Dhabi’s competitive semiconductor research capability. Built as a part of a broader research and academic collaboration between ATIC and Masdar Institute, the facility provides the ultra-clean environment and photolithography tools needed for advanced microelectronics research and small-scale production.

- Masdar Institute regrouped all eight Master’s programs under four departments such as the Department of Electrical Engineering and Computer Science (EECS), Department of Engineering Systems and Management (ESM), Department of Mechanical and Materials Engineering (MME) and the Department of Chemical and Environmental Engineering (CEE).

- Tawazun Economic Council, which is mandated to oversee implementation of the UAE Tawazun Economic Program, and Masdar Institute have entered into a collaborative research project focusing on land systems and advanced materials. The agreement also aims to build capabilities in the industrial and advanced manufacturing sectors in the UAE.

- Bayanat for Mapping and Surveying Services, a Mubadala Company, launch of a collaboration project with Masdar Institute to develop water quality monitoring tools in the Arabian Gulf using the satellite receiving station at the research-based institution.

- The Abu Dhabi Water and Electricity Authority (ADWEA) signed a scholarship co-operation agreement Masdar Institute officially expanding the strategic collaboration to jointly contribute to human capital development. According to the agreement, ADWEA Scholars will be sourced, admitted, supported, funded and supervised for post-graduate courses at Masdar Institute.

- Masdar Institute is working with aerospace and defense corporation Boeing, Abu Dhabi flagship carrier Etihad, and specialty materials company Honeywell UOP on the development of sustainable biofuels for aviation, using integrated saltwater agricultural systems;

- The Abu Dhabi Company for Onshore Oil Operations (ADCO), Petroleum Institute (PI), Massachusetts Institute of Technology (MIT), and Masdar Institute have joined together for collaborative research into carbon sequestration;

- Masdar Institute is collaborating with Siemens on a long-term R&D program for Smart Grids, Smart Buildings (SGSB), and Carbon Capture and Storage (CSS) in form of scholarships and R&D funding. The agreement covers solar energy technology research and development to enhance the use of PV panels in the Middle East as well as joint testing and research activities focusing on solar panel coatings.

- Work is progressing with Emirates Aluminum (EMAL) on a research program to improve the efficiency and overall environmental performance of aluminum ore smelting and production. Training programs are also developed for the purpose of creating a skilled national workforce capable of meeting the needs of the industry.

- An with IRENA awards up to 20 scholarships annually to talented students to help develop a knowledge-based economy through capacity building and human development.

- Inked a landmark deal with Toyota Motor Corporation (January 2012) for an annual scholarship program to a highly-qualified graduate student to work on projects in the area of technologies for sustainable development.

- A collaboration agreement with ICT Fund of the Telecommunications Regulatory Authority (TRA) (May 2012) provides scholarships for 30 UAE national students to study ICT at the Masdar Institute. This aims to provide the ICT sector in the UAE with skilled Emirati professionals.

- The Global Green Growth Institute (GGGI) has joined hands with Masdar Institute and the Research Institute for Industrial Science and Technology (RIST) in Pohang of South Korea (September 2012) to design a robust and cost-efficient micro-grid operating on 100% renewable energy sources such as solar PV, small wind power and biofuel production from waste and algae. The micro-grid can be linked to local seawater desalination and electric-powered boats used for accessing an island near Abu Dhabi.

- An MoU (October 2012) with the Abu Dhabi Water and Electricity Authority (ADWEA) aims to identify areas for exchange of scientific and technological information through research collaborations, covering sustainable energy, water and environmental issues. Short courses and seminars for the benefit of internal and external stakeholders will also be developed, while ADWEA will ensure its respective personnel offer support and assistance to students on graduate courses at Masdar Institute in their experimental research thesis work.

- GLOBALFOUNDRIES has granted students, researchers and professors from Masdar Institute privileged access to its technology development platform at its Abu Dhabi headquarters to process design kits (PDKs) for advanced semiconductor technology nodes, including the latest and revolutionary HKMG 28nm channel transistor technology. Graduate students preparing for their research project will also have the opportunity to apply for a three-to-six month internship at one of GLOBALFOUNDRIES sites worldwide.

- A multi-entity taskforce led by Masdar Institute and coordinated by the Executive Affairs Authority of Abu Dhabi (EAA) has been set up to focus on managing the energy demand for cooling in Abu Dhabi. The taskforce also includes participation and support from the Abu Dhabi Water and Electricity Authority (ADWEA), the Regulation and Supervision Bureau, the Department of the Municipal Affairs (ADM), and the Urban Planning Council (UPC).

- Abu Dhabi's Department of Transport (DoT) and Masdar Institute signed a memorandum of understanding (MoU) for exchange of information in public transport systems and basic traffic data for a research project. The project will investigate the transportation infrastructure, technology needs and public attitudes in Abu Dhabi, pertinent to instituting a level of electrification in the Abu Dhabi transportation system.

MIT Partnership

- MIT contributes to development of degree programs and curriculum planning at Masdar Institute;

- Senior administration staff at Masdar Institute are assessed and hired in consultation with MIT;

- MIT conducts assessment of potential faculty and students in cooperation with the Masdar Institute ;

- MIT and Masdar Institute faculty are engaged in on-going collaborative research projects;

- Masdar Institute students may take part in a practical experience program at MIT;

- In conjunction with their Master of Science diploma, Masdar Institute graduates are issued a certificate jointly signed by Masdar Institute & MIT in recognition and endorsement of the successful completion of the Master's degree requirements;

- Masdar Institute's PhD program (IDDP) is based on a similar program at MIT;

- MIT faculty serve as members on the IDDP Research Supervisory Committee at Masdar Institute as well as PhD co-advisors for PhD students;

- Masdar Institute PhD students spend one semester at MIT prior to their graduation.

Faculty

- Masdar Institute has 81 faculty members from more than 20 countries, enabling students to benefit from a unique range of insights and experiences;

- Masdar Institute faculty are graduates from leading international institutions including MIT, Stanford University, University of California – Berkeley, University of Michigan, Korea Advanced Institute of Science and Technology, University of Waterloo, Oxford University, Cambridge University and Harvard University, etc.

Students

- Masdar Institute had its first intake of students in 2009, consisting of 89 students;

- Masdar Institute saw the graduation of its first class of scientists and engineers in June 2011, comprising 70 graduates in 5 Master's programs;

- The graduation of the second class was in May 2012, including 54 graduates in seven Master's programs;

- A total of 90 students of 2013 Class received their degrees in eight Master's programs in June 2013

- Masdar Institute's fifth intake consisted of 203 students, who joined the Institute's academic programs in the Fall Term of 2013;

- The total number of enrolled students as of September 2013 stands at 417.

- The number of UAE nationals increased by more than 15% over the previous year; females represent 55% of all Emirati students;

- Low student to faculty ratio of around 5:1;

- Student body is expected to grow to 600 - 800 over the next five years.

Achievements

2013

- Launched five Institute Research Centers (iCenters) – Institute Center for Innovation and Entrepreneurship (iInnovation), Institute Center for Energy (iEnergy), Institute Center for Water and Environment (iWater), Institute Center for Microsystems (iMicro) and Institute Center for Smart and Sustainable Systems (iSmart) – to consolidate existing research activities.

- The 'UAE Solar Atlas' developed by the Research Center for Renewable Energy Mapping and Assessment (ReCREMA) at Masdar Institute in collaboration with the IRENA received the "Technology of The Year" award at the Middle East Solar Awards (MESA) 2013. Officially launched during the World Future Energy Summit in January 2013, the UAE Solar Atlas was made publicly available to the international community through the Global Atlas online portal that was developed by IRENA.

- Dr Fred Moavenzadeh, President, Masdar Institute, was named the Education CEO of the Year 2013 by the Gulf Business Industry Awards that aim to recognize the most successful businesses and leaders from various sectors.

- Academically, the eight Master's programs are grouped under four departments – the Department of Electrical Engineering and Computer Science (EECS), Department of Engineering Systems and Management (ESM), Department of Mechanical and Materials Engineering (MME) and the Department of Chemical and Environmental Engineering (CEE).

- Research staff etched a silicon wafer for the first time in the UAE, marking the beginning of a new phase in advanced technology learning and innovation. With the etching of silicon wafer, the Masdar Institute Fabrication Facility has entered the operational phase.

- Two faculty members achieved a pioneering breakthrough in developing a novel membrane that can operate in an 'in-situ' cleaning system for desalination purposes. A patent application has been filed for the technology

- Three students successfully completed a semiconductor chip design using GlobalFoundries 65nm process, the first GlobalFoundries tape-out from the Middle

East and North Africa (MENA) region. The 65nm wafers, taped-out at Masdar Institute, were finished processing at GlobalFoundries later.

- Two UAE national female students – Shaikha Al Zaabi and Noura Al Dhaheri – published a research paper in the prestigious 'The International Journal of Advanced Manufacturing Technology'. The paper identifies the principal barriers to implementing sustainable supply chain management (SSCM) in the fasteners manufacturing industry.

- Contribution of a PhD student and Research Assistant at Masdar Institute, towards finding the best solar cells for the Phonesat' project during his internship at NASA's Ames Research Center was rated among 'Top 100 Technology Projects' by '*Popular Science*' Magazine.

- A PhD student also developed 'UltraSmart', an integrated device that can turn a smartphone into a powerful multipurpose tool for engineers and scientists at a cost of only US$10. The 'UltraSmart' project was one of the four winners in the Intel Business Challenge Middle East & North Africa 2013 regional finals ceremony held in Abu Dhabi.

2012

- Team Crowdscanner, a team of crowd-sourcing experts led by Dr. Iyad Rahwan, Associate Professor - Computing and Information Science, Masdar Institute, in collaboration with Dr. Manuel Cebrian, Research Scientist at University of California, San Diego (UCSD), won the international Tag Challenge competition in April 2012, redefining the limits of technology-mediated social mobilization and rapid information gathering. The team was the only one to track down three out of the five targets across the world – in New York City, Washington DC, London, Stockholm and Bratislava in Slovakia – within the stipulated time of 24 hours.

Outreach

The mission of outreach programs is to reinforce students' knowledge, interest and academic skills in science, engineering and technology as they relate to the graduate programs and research conducted at the Masdar Institute.

Masdar Institute currently offers **three outreach programs** targeting mainly UAE nationals; Young Future Energy Leaders, Summer Internships, and "Ektashif".

1. Young Future Energy Leaders (YFEL):

- YFEL works to achieve the following goals:

  - Educate YFEL members (YFELs) in the fields of advanced energy and sustainability through short courses, workshops and seminars;

  - Provide a platform to engage YFELs in debates and global discussion in advanced energy and sustainability;

- Provide opportunities for YFELs to share their innovative ideas in advanced energy and sustainability with their peers as well as industry, government and academic leaders;

- Provide networking opportunities and visibility to YFELs through high level events and meetings;

2. Summer Internships:

Masdar Institute's first summer internship was launched in July 2011;

Internships are designed to achieve the following goals:

- Nurture adequately qualified university students with a penchant for research and innovation;

- Inspire UAE undergraduate students to pursue graduate studies at the Masdar Institute;

- Promote a culture of research and innovation among local undergraduate students and the UAE community as a whole;

- Raise awareness of the role of R&D in developing knowledge-based economy and sustainability in the UAE.

3. "Ektashif":

"Ektashif" is a residential program that brings together talented UAE undergraduate engineering and science students to discover and learn about renewable energy, sustainability and the environment;

'Ektashif' is designed to:

- Raise students' awareness of current energy and sustainability issues;

- Increase students' knowledge and interest in renewable energy, sustainability, and scientific research;

- Encourage students to consider conducting further research in clean energy and sustainability;

- Inspire students to pursue a graduate program in science or engineering at the Masdar Institute.

Campus

- Designed by Foster & Partners, Masdar Institute sustainable campus provides a new benchmark as a model of sustainable living and working;

- The first phase of the campus (1A) includes 102 apartments, two open plan laboratories, a knowledge center, a 90-seat auditorium, medical center, gym, canteen and retail outlets;

- Powered entirely by renewable energy, the campus uses significantly less energy and water than business as usual.

- The second phase (1B) comprises 221 apartments, three laboratories, a multipurpose hall, a gym, Olympic swimming pool, cafes, retail outlets, offices and meeting rooms.

Student Residence:

- Student residence contains eight buildings, four for males, three for females and one for families; a total of 323 apartments;

- The buildings feature the red sand-colored undulating glass reinforced concrete (GRC) screens that replicate the function of the traditional Arab mashrabiya screens;

- The balconies design provide privacy as well as shade from the sun, thus preventing solar gain on the building walls;

- The façade is highly-sealed and insulated, and wrapped in 90 percent recycled aluminum sheeting in the same red color of the GRC screens;

- Water saving specifications allow for 54 per cent less potable water consumption compared to the UAE average with separate grey- and black-water drainage.

Masdar Institute **campus landmarks** include:

- Personal Rapid Transit System
- Student Residence
- Knowledge Center
- Wind Tower
- Laboratories
- Cleanroom

Personal Rapid Transit (PRT) System:

- The PRT system can accommodate four passengers and travels at speeds up to 40kph on straightaway and 25kph on curves

- It is powered by a battery that recharges while vehicles are docking in the stations

- Driverless vehicles controlled by an advanced navigation system and are equipped with onboard sensors to detect obstacles and avoid accidents

- Wireless connection keeps PRT vehicles linked to the central computer

- Easy to control by following the information on screen and interface for vehicle activation, intercom, doors, medical assistance and emergency stop

Knowledge Center:

- The domed roof of the Masdar Institute’s Knowledge Center (Library) is meant to

optimize the building's photovoltaic (PV) energy harvesting;

- Windows at the Knowledge Center are shaded to prevent direct sunlight from reaching inside and reduce building cooling loss;

- The library offers students an in-house collection of hundreds of reference books and academic titles, as well as access to thousands of electronic materials including journals, books, dissertations, reports and online research databases;

- The Library is committed to supporting the academic and research missions of the Institute by providing access to library services, collections in a variety of formats, and information resources designed to meet the curriculum, research, professional, intellectual, creative and personal needs of the university community;

- The Library works to promote and improve users' competency and information literacy skills through cultivating strong research, analysis and assessment abilities.

- The Library strives to equip students with the real-world information and research skills necessary for success in the 21st century knowledge economy.

- Masdar Institute Library seeks to achieve the following objectives:

  - To support Masdar Institute's mission of establishing and continually evolving interdisciplinary, collaborative research and development in advanced energy and sustainability;

  - To support the instructional, information, research, and curriculum needs of the Institute through a large collection of electronic databases and online resources;

  - To enable the user to understand and utilize effectively the full range of information services;

  - To foster the acquisition of skills necessary for independence in lifelong learning;

  - To maintain and develop relationships with other library services and institutions within the county and abroad; and to facilitate cooperation and collaboration.

Wind Tower:

- The Wind Tower is a modern interpretation of the region's most widely-known traditional architectural feature called 'Al Barjeel';

- It is 45 meters high and is designed to capture cooler winds and directs them to the open-air public square;

- Sensors at the top operate high-level louvers to open in the direction of prevailing winds and to close in other direction to direct wind down the tower;

- Air-cooling techniques enable the wind tower to generate a cool breeze in the square below even in low-wind conditions;

- The LED lighting of the tower will change color to let residents and visitors know whether energy use at the Institute is above or below target level;

- It is used as a platform for scientific instruments including weather measuring equipment and air quality monitoring tools.

Laboratory:

- The labs' wall insulation levels are also more than three times higher than the benchmark set by the American Society of Heating, Refrigerating and Air Conditioning Engineers;

- Strict air tightness standards aim to control the infiltration of hot and humid air;

- Laboratory structures have air-filled ethylene tetrafluoroethylen (ETFE) cushions that ensure almost no solar gain on the structures and limit the heat radiated to the street;

- The laboratory interior has been designed with an open-plan, column-free floor plan to facilitate conducting integrated and cross-disciplinary research projects;

- All services such as power, data, gasses and ventilation are located in the overhead service carriers, thereby enabling plug-and-play access anywhere on the floor;

- All lab furniture including the largely glass-walled offices can be easily re-located based on researchers' requirements;

- Masdar Institute laboratories are equipped with state-of-the-art facilities and equipment that support its applied research in strategic areas relevant to Abu Dhabi such as carbon capture and sequestration, semiconductor industry, nanotechnology, clean mobility, aerospace engineering and other areas.

Cleanroom:

- A cleanroom is a specialized laboratory room in which the air is highly filtered in order to keep out impurities;

- Cleanrooms are typically used in manufacturing or scientific research that requires a low level of environmental pollutants such as dust, airborne microbes, aerosol particles and chemical vapors;

- The air entering a cleanroom from outside is filtered to exclude dust, and the air inside is constantly recirculated through air filters to remove internally generated contaminants;

- Masdar Institute's micro-fabrication laboratory includes a 300-sq meter cleanroom facility (class 1000/100) that already hosts state-of-the-art equipment partially donated by ATIC and installed with the collaboration and guidance of the Microsystems Technology Lab at the Massachusetts Institute of Technology's (MIT);

- Masdar Institute cleanroom helps to support its nano-fabrication research and other studies on novel nano-electronic and photonic devices within the Microsystems Engineering program;

- Masdar Institute cleanroom is meant to strengthen the Institute's nanofabrication capabilities for nanoelectronics and nanophotonics, while fostering specific skills of students in the semiconductor industry.

Alumni

- Masdar has more than 200 alumni including 70 in its inaugural class of 2011; 54 in the second class of 2012; and more than 80 in the 2013 Class;

- Masdar Institute alumni are employed at leading companies, including Mubadala, Siemens, PRTM Consulting, KEO Consulting, Saudi Aramco, Masdar Power, Point Carbon, Areva Solar, Lux Consulting, GE, Environment Agency Abu Dhabi, E.ON Consulting, Hilti Construction, PwC, IRENA, Unilever, and Ramboll Consulting, etc.

- Over 50 per cent of Masdar Institute's alumni have been employed in local and international companies, while 35 per cent are pursuing a PhD at Masdar Institute and other international universities;

- Masdar Institute's partnerships with leading local companies help boost its students employment prospects;

- Internships, career fairs, job recruitment days and career workshops facilitate Masdar Institute's students employment after graduation;

- Networking opportunities such as international conferences, seminars and lecture series allow students to network with potential employers and discuss career plans and prospects.