Abdul Latif Jameel

Opening doors

The Abdul Latif Jameel Magazine

Autumn 2017

In this month's issue we talk about

Kids in the classroom: Improving education for children in developing economies

Featured Articles

Abdul Latif Jameel has been investing from the heart of Arabia across the promising MENAT region and beyond for over seventy years – shining a light on new opportunities for investment and growth. Trusted to open new doors; now, we are opening more.

Helping people who strive for better, to have better: better means; better lives; better prospects. Helping businesses who look further, to reach further. Into new markets, new homes, and new considerations.

We can do this because we are determined in our quest for new potential; and we succeed because we never lose sight of why this matters. In this magazine, we showcase our investment in the development of the economies and the quality of life of people in the region.

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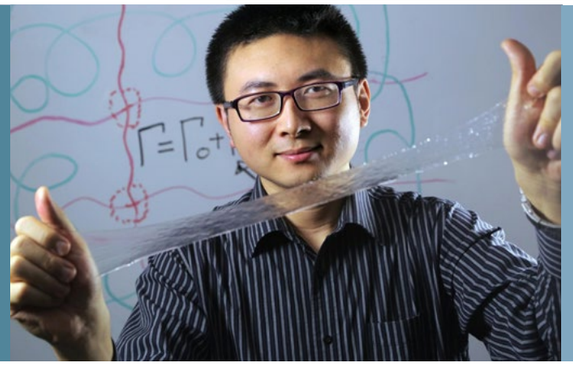

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Kids in the classroom: Improving education for children in developing economies

A new policy report published by the Abdul Latif Jameel Poverty Action Lab (J-PAL), based at the Massachusetts Institute of Technology, has determined which types from a wide range of programs tend to be the most effective ways to increase the number of children enrolled in and attending full-time education in low and middle-income countries.

The report – **Roll Call: Getting Children into School**[1] – drew lessons from 58 randomized trials across 28 low and middle-income countries. It aims to provide a framework for policymakers around the world as attempts are made to further increase the provision of education for children in every country.

Rachel Glennerster, Executive Director of J-PAL

Rachel Glennerster, Executive Director of J-PAL, says[2]: "This knowledge represents the state of the art in rigorous evidence on how to address the global schooling challenge. Of course, not every program found to be effective in one place should be implemented in another – but these broad insights, when considered alongside local data and contexts, can help inform the decisions of policymakers and others seeking to improve access to education and learning for all."

According to the United Nations' (UN) Millennium Development Goals Report, by 2015 91% of primary school age children (6-12 years old) in the world's developing regions were enrolled in education, up from 83% in 2000.[3] There was also a significant rise in the enrolment levels of children aged 12-16 – up to 65% in 2014, compared with 55% in 2000.[4]

However, 61 million primary school children were out of education in 2015, along with more than 202 million secondary school children.[5] Furthermore, enrolment is only one part of the issue. Even if children are enrolled, it does not mean that they will actually attend - and attendance figures remain challenging. In India,

[1] Roll Call: Getting Children Into School, Abdul Latif Jameel Poverty Action Lab, August 2017
[2] 4 common barriers to girls' schooling – and how to overcome them, ONE, 9 August 2017
[3] The Millennium Development Goals Report 2015, United Nations, accessed October 2017
[4] Net enrolment rate, secondary, both sexes (%), The World Bank, accessed October 2017
[5] UNESCO Institute for Statistics, accessed July 2017

for example, 29% of enrolled primary school students were absent during unannounced visits.[6] In Uganda, the figure was 35%. [7]

A Middle East School Report

Enrolment statistics around the Middle East and North Africa (MENA) region are generally positive.

The same UN report found that 99% of primary school age children in North Africa were enrolled in school in 2015. In Western Asia, that figure fell slightly to 95% - but was still four percentage points high than the combined figures for the world's developing regions.[8]

Also, since 1960 the average level of schooling across the MENA region has quadrupled[9] and illiteracy has halved since 1980. However, while the overall trends are positive, there are still obstacles to overcome.

Room for Improvement

According to the UN, there is a stark disparity between educational opportunities in developing regions based on household incomes, where "children in the poorest households are four times as likely to be out of school as those in the richest households."[10] Further, in 2015 a joint report by UNICEF and the UNESCO Institute for Statistics claimed that more than 21 million children across the MENA region were "either out of school or at risk of dropping out."[11]

According to its calculations, more than 12 million were already out of school, six million were at risk of dropping out, and three million were out of school due to the conflicts in Syria and Iraq. It also claimed that girls living in the MENA region were 25% less likely to be in education than boys.

Improving attendance

Against this backdrop, it is crucial for policymakers across the MENA region to look at ways to maximize the number of children enrolling in and attending school.

The report produced by J-PAL determines that "student participation is sensitive to the perceived costs and benefits of education", so seeking ways to increase the benefits and reduce the costs is an obvious route forward. This can be achieved, according to the report's authors, through several methods.

1. Reducing the travel time to school

Travelling incurs costs in time and money, and in some areas also carries an exposure to unnecessary danger. The J-PAL report assessed studies in Afghanistan and Pakistan into the impact of leveraging existing infrastructure to create new schools closer to remote populations. Both studies found this led to significant increases in the number of children attending school. In the Afghanistan research, introducing a school to a village where children previously had to travel an average of three miles, increased enrollment rates from 27% to 69%. The impact was particularly helpful for girls, for whom the Afghanistan program increased enrollment rates by 17 percentage points more than it did for boys.

Where it is not feasible or advisable to build new schools, the travel time can be reduced through other methods. In India, a program to give bicycles to secondary school girls, so they could travel to and from school in reduced times, led to a 32% increase in girls' enrollment.

2. Subsidies and in-kind transfers

Secondary school fees are found in 63% of low-income countries and 22% of middle-income countries. In contrast, only 6% of high-income countries charge for secondary school education. Those who can least afford to pay for education are most often the ones being charged for it. A study in Ghana found a clear improvement in enrollment rates when both girls and boys received full secondary school scholarships.

Other methods for reducing the costs of education include cash incentives (a cash transfer of just US$ 20 per year to students in Cambodia had a significant positive effect) and non-cash transfers, such as free uniforms or meals – providing uniforms decreased dropout, and school meals increased daily attendance.

3. Improving children's health

Tackling large-scale public health issues is not an easy feat, but does bring significant increases in educational enrollment and attendance. When children are not sick, and not sapped of energy as they battle against illness, they are much more likely to attend school. In India, providing preschoolers with deworming medication lifted preschool participation rates by almost 6 percentage points. In Kenya, primary school absenteeism was reduced by 30% after a program was introduced to treat intestinal worms.

4. Increasing the quality of education

If you cannot see any tangible benefit in attending school, are you likely to persist? J-PAL's assessment of 16 studies found that improving the quality of education on offer can – although not always – increase student attendance. However, it appears that third-party measurement may help convince sceptical parents. J-PAL's report states that "many of the programs that improved quality and increased student participation included an element of community monitoring or school-based management, which may have helped parents perceive the increases in quality."[12]

5. Changing perceptions around the future impact of a good education

Making children, and parents, more aware of the benefits of education can help improve attendance. When eighth-grade boys in the Dominican Republic were questioned about their future earnings, almost half did not expect to earn more if they stayed in education for longer. However, when researchers informed the boys of the reality – showing them the average wages of workers in their area based on education levels – there was a clear impact; boys who received this information attended an additional 0.20 years of school. Overall, the program generated an additional 0.24 years of schooling for every US$ 100 spent. Researchers also believe the program could be made much more efficient if implemented at a larger scale, with the potential to achieve 2.6 additional years of schooling per US$ 100 spent.[13]

Informing policy with research

Following its assessment of 58 randomized trials, the J-PAL report provides a high-level view of the impact of a range of different activities on school enrollment and attendance.

Because costs for educational interventions can be high, J-PAL analyzed the cost-effectiveness of different approaches. The report finds that some programs – like increasing access to deworming and iron pills – can achieve high impacts at relatively low cost.

After considering the individual and collective merits of each program, J-PAL researchers outlined seven practical considerations for policymakers looking to increase school enrollment and attendance in low and middle-income countries. These range from the effectiveness of conditional and unconditional cash transfers, to the viability of reducing costs or the impact of changing perceptions.

The report concludes[14]:
"Which strategy is best to pursue will depend on local conditions and challenges. In areas where there are few schools... finding ways to provide low-cost local school options is likely a priority. Similarly, in places with high parasitic worm load or very high rates of anaemia, programs that cheaply address these issues should be investigated for feasibility. These are specific strategies that make sense where these specific needs are present.

... Across very different settings, many studies have shown that school participation is sensitive to changes in these real and perceived costs and benefits. But precisely how these policies are designed and implemented can have important implications for their effectiveness and particularly their cost-effectiveness."

While there are nuances to consider in each trial and activity, the J-PAL report ensures that policymakers do now have access to foundational information that could significantly enhance education provision in low and middle-income countries across the globe.

J-PAL

[6] Annual Status of Education Report 2016, ASER Centre, 18 January 2017
[7] School Data – Uganda 2014, Uwezo.
[8] The Millennium Development Goals Report 2015, United Nations, accessed October 2017
[9] Education in the Middle East and North Africa, The World Bank, 27 January 2014
[10] The Millennium Development Goals Report 2015, United Nations, accessed October 2017
[11] School enrolment rates up but 21 million children in the Middle East & North Africa risk missing out on an education, UNICEF, 15 April 2015
[12] Roll Call: Getting Children Into School, Abdul Latif Jameel Poverty Action Lab, August 2017
[13] Roll Call: Getting Children Into School, Abdul Latif Jameel Poverty Action Lab, August 2017
[14] Roll Call: Getting Children Into School, Abdul Latif Jameel Poverty Action Lab, August 2017

Charles Clark Toyota's hybrid electric vehicle range at Molineux Stadium, home of Wolverhampton Wanders soccer team, ready for test drives.

UK shoots towards goal of a cleaner driving future

As more than nine million hybrid cars cruise the world's roads, the future of driving looks increasingly 'clean'. With better fuel efficiency, lower servicing costs and reduced maintenance bills, it's not hard to see why hybrids are taking an ever-larger share of the market. Uber has promised to ensure that its drivers only use hybrid or electric cars from 2020[1], and a succession of manufacturers have pledged to make only hybrid or electric cars in the imminent future[2][3][4].

The UK is one of many major automotive markets where sales of electric hybrid cars – a technology spearheaded by Toyota – continue to grow; a trend that has been further fueled by the government's decision to ban new diesel and petrol cars and vans from 2040[5].

For Charles Clark, Abdul Latif Jameel's Toyota dealership in the UK, the legislative and cultural changes are good news.

In September 2017, it held an event at Molineux Stadium, the home of former Premier League football club Wolverhampton Wanderers, to promote Toyota's hybrid range to local buyers.

The C-HR, RAV4, Yaris and Prius were all available for hour-long test drives. Afterwards, a majority of the test drivers said the Toyota hybrids performed better and provided a smoother drive than comparative models from other manufacturers.

And it is not just the mid-market where hybrids are making an impression. In the luxury market, the Lexus LC is also set to make its mark – despite only 300 being released in the UK so far. The LC is the first Lexus to use a Lithium-ion battery and clocks 0-60 mph in an impressive 4.7 seconds.

As the the UK shoots towards a hybrid/electric motoring future, Charles Clark and Abdul Latif Jameel are not only keeping the ground maintained with their sponsorship of the soccer team's ground maintenance team, but poised to help customers score in the industry's electrifying new future.

[1] Uber: London drivers must use hybrid or fully electric cars from 2020, The Guardian, 8 September 2017
[2] Jaguar Land Rover to make only electric or hybrid cars from 2020, The Guardian, 7 September 2017
[3] All Volvo cars to be electric or hybrid from 2019, The Guardian, 5 July 2017
[4] VW to Build Electric Versions of All 300 Models by 2030, Bloomberg, 11 September 2017
[5] New diesel and petrol vehicles to be banned from 2040 in UK, BBC News, 26 July 2017

Renewable Energy in the GCC: The Human Impact

Around the world, mankind faces grave challenges that are driving profound changes in the energy market and society's reliance on fossil fuels.

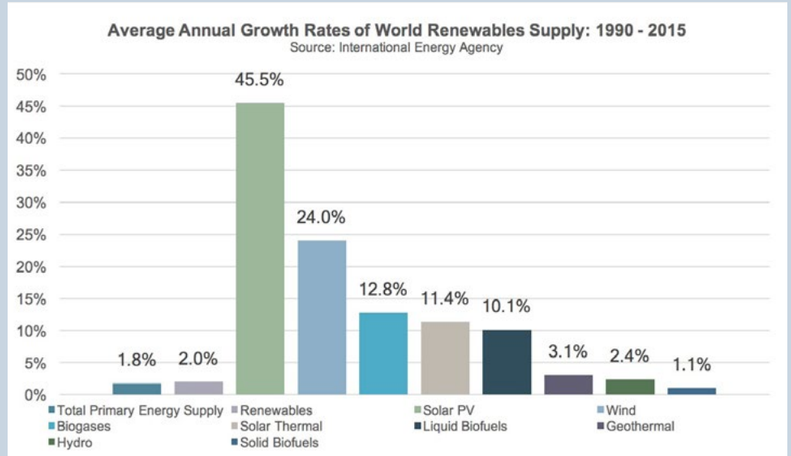
Environmental concerns over traditional energy sources are being compounded by uncertainties over costs, dwindling fossil fuel reserves, and the rising demand coming from an increasingly urban, global population that continues to grow.

On top of this direct demand for more energy, water scarcity is also causing further pressures, with significant energy resources required to power desalination plants.

Against this backdrop, it is little wonder that renewable energy is drawing an increasingly large focus from society, commercial organizations and governments – the latter with some significant success. In 2015, 22.8% of global electricity production came from renewable sources, with only coal (39.3%) and gas (22.9%) accounting for a larger share. In contrast, nuclear (10.6%) and oil (4.1%) were responsible for relatively small amounts of electricity generation. The average annual growth rate of renewables has been remarkable, with solar PV leading the charge at 45.5% average growth per annum from 1990-2015.[1]

What is renewable energy?
In the Middle East, three main renewable energy sources are driving this change in the energy mix:

Solar energy, which has several technologies, including concentrated solar power (CSP) used to heat water to steam to power turbines. However, by far the most prevalent is **photovoltaic** energy, which is generated when solar cells (or photovoltaic cells) convert sunlight into electricity. It is more than 60 years since scientists first discovered that silicon creates an electric charge when exposed to sunlight. In some solar cells, silicon has been replaced with other materials such as solar inks, solar dyes, and conductive plastics. **Wind energy**, which is generated when wind turbines are used to create mechanical power, which is then converted into electricity by a generator.



And **geothermal energy**, which involves using the heat found in natural hot water reservoirs to drive an electric generator.

Renewables on the rise
Figures from the International Energy Agency reveal the impact of renewables generation across the 35 member states of Organization for Economic Cooperation and Development (OECD). In 2016, 23.8% of all electricity generated in the OECD came from renewables – a figure up 3.8% year-on-year, driven by an increasing uptake in wind and solar photovoltaic energy generation. These two renewable energy sources grew at an annual rate of 21% and 43% respectively between 2000 and 2016.[2]

Around the world, responsible governments recognize the massive energy challenge facing their societies and are themselves are setting ever more ambitious renewable energy targets.

In the European Union, the aim is to meet 20% of energy needs from renewable sources by 2020[3], with some EU member states going even further. Germany, for example, is planning to generate 100% of its electricity supply from renewable energy by 2050[4].

In Saudi Arabia, the government committed to developing a "competitive

[1] Renewables Information: Overview (2017 edition), International Energy Agency, accessed August 2017
[2] Coal falls as gas rises: World energy balances in 2016, International Energy Agency, 8 August 2017
[3] Renewable Resources: The Impact of Green Energy on the Economy, Business.com, 22 February 2017
[4] 100% Renewable Electricity Supply by 2050, United Nations, accessed August 2017

renewable energy sector" in its Vision 2030 plan. Since the inspiring ambitions of Vision 2030 were first outlined, the initial target of generating 9.5GW of renewable energy by 2030 has been brought forward by seven years, to 2023.

Saudi Arabia: renewal through renewables

Although this target is ambitious, the government has already taken major steps in developing the country's renewable energy market, shortlisting bidders for 700MW of solar and wind power projects in the first round of its renewable energy initiative in April 2017.

His Excellency Khalid Al Falih, Saudi Energy Minister, said: "The market response to the Kingdom's invitation to its first renewable energy projects has been overwhelmingly positive, demonstrating market confidence in our vast renewable energy potential and investment environment."[5]

This confidence and determination reflect the enormous potential for renewables in Saudi Arabia.

Thanks to its position in the 'sun belt', which stretches from the west coast of North Africa to the eastern side of Central Asia, fewer countries have higher levels of solar radiation than Saudi Arabia. Its climate and vast stretches of flat land are ideal for solar panel installations, with much of the infrastructure needed to connect solar power to the grid already in place.

In the country's northeast and central regions, as well as those near mountains in the west, there is enough wind to enable a large-scale economically viable wind energy industry to flourish. To be commercially sustainable, wind turbines need to harness average wind speeds of six meters per second. In Saudi Arabia's three most suitable locations, average wind speeds are consistently measured at eight meters per second - 33 per cent higher than the point at which wind energy becomes economically viable.

The hot springs of Saudi Arabia, meanwhile, are ideally suited for geothermal power generation. Al Khouba hot spring is considered the most important of at least 10 hot springs spread across the country that could be harnessed to produce geothermal energy.

The real-world impact of renewable energy

As the growth of renewables continue to accelerate, there will be significant impacts on communities within Saudi Arabia, the GCC and across the world. These impacts are likely to be seen in three main areas: cheaper energy bills for consumers, new jobs to service the growing renewables industry, and lower levels of air pollution and harmful emissions.

In the five years leading up to 2013, the World Health Organization (WHO) recorded an 8% rise in global air pollution levels[6].

According to the World Bank and the Institute for Health Metrics and Evaluation (IHME), 87% of the world's population now live in countries in which ambient pollution levels exceed air quality guidelines set by WHO. That figure rises to 90% in low and middle-income countries. Of cities with more than 100,000 inhabitants in low and middle-income countries[7], 98% fail to meet WHO air quality guidelines.[8]

As air pollution increases, so too does the risk of a range of health concerns – including stroke, heart disease, lung cancer, and chronic respiratory diseases. In 2013, 5.5 million lives were lost to air pollution, making it now the fourth leading risk factor for premature deaths worldwide.[9]

However, the introduction of renewables into the energy mix should significantly reduce the use of fossil fuels, which cause the vast majority of air pollution. The International Renewable Energy Agency estimates that the GCC region is likely to see fossil fuel reductions in the power and water sectors of 25% by 2030. In total, 2.5 billion barrels of oil equivalent could be saved through the region's renewable energy plans between 2015 and 2030.[10]

Aside from health benefits, the growth of renewables is also set to provide economic benefit, too. Renewable energy offers large-scale job creation opportunities, as well as the chance to rebalance GCC economies and create cleaner environments in which to live.[11]

According to the UK Energy Research Centre, solar PV projects create at least twice the number of jobs per unit of electricity generation compared with coal or natural gas.[12] By 2030, renewable energy could be potentially responsible for 207,000 GCC jobs – of which almost 77,000 may be in Saudi Arabia.[13]

Finally, as the technology behind renewable energy generation becomes more efficient, the cost to the consumer will reduce. Producing energy from renewables is, in general, now more efficient than producing traditional energy. Once the initial cost of installation has been passed, the production of energy becomes much cheaper – meaning lower utility bills for consumers.[14]

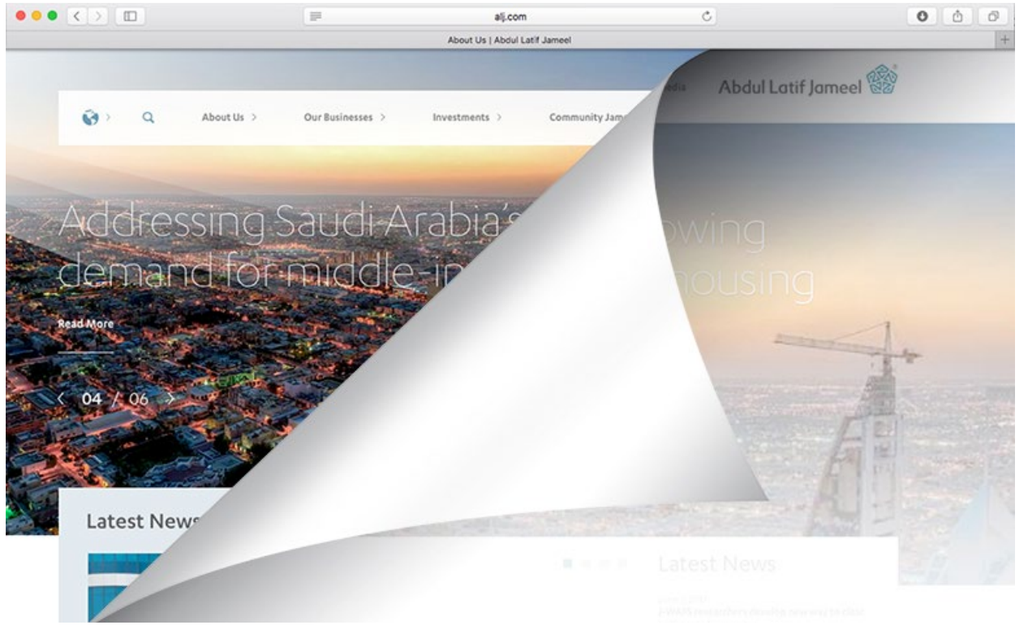
A cleaner, cheaper future for all

Throughout its history, Abdul Latif Jameel has been determined to advance the communities it serves. Now, with its investment in renewable energies, it continues in that fine tradition, recognizing an opportunity to help the Saudi Arabian government fulfil its transformational ambitions over the coming years.
Omar Al-Madhi, CEO of Abdul Latif Jameel Energy Saudi Arabia, said: "Renewable energy is a chance to create new jobs, new skills and new opportunities for the local population. By localizing technology and transferring knowledge, we can provide a strong foundation on which the Saudi renewables industry can thrive."

In 2013, 5.5 million lives were lost to air pollution, making it now the fourth leading risk factor for premature deaths worldwide.[9]

To find out more about Abdul Latif Jameel Energy's investment in renewable energy solutions, and how it is working to shape a better future for all in Saudi Arabia, visit **www.alj.com/energy**.

[5] Saudi Arabia Announces Qualified Companies for Round 1 of National Renewable Energy Program, Renewable Energy Project Development Office, 10 April 2017
[6] Air pollution levels rising in many of the world's poorest cities, World Health Organization, 12 May 2016
[7] The Cost of Air Pollution: Strengthening the Economic Case for Action, World Bank and Institute for Health Metrics and Evaluation (IHME), September 2016
[8] WHO Global Urban Ambient Air Pollution Database (update 2016), World Health Organization, accessed June 2017.
[9] Air Pollution Deaths Cost Global Economy US$225 Billion, World Bank, 8 September 2016.
[10] Renewable Energy Market Analysis: The GCC Region, International Renewable Energy Agency, 2016.
[11] Renewable Energy Market Analysis: The GCC Region, International Renewable Energy Agency, 2016.
[12] Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy, UK Energy Research Centre, 2014
[13] Renewable Energy Market Analysis: The GCC Region, International Renewable Energy Agency, 2016.
[14] Renewable Resources: The Impact of Green Energy on the Economy, Bussines.com, 22 February 2017



New corporate website for Abdul Latif Jameel

Abdul Latif Jameel has successfully launched its new corporate website in Arabic, English and Turkish– alj.com – with Japanese, Chinese, Spanish and French versions soon to follow.

The improved site has been expanded to reflect the most recent changes in the business, including the ongoing focus on and expansion of Abdul Latif Jameel Energy and Abdul Latif Jameel Land.

An enhanced 'Investments' section features dedicated sections on Saudi Arabia and International opportunities, highlighting Abdul Latif Jameel's active Investments arm and also working to support the goals of Saudi Arabia's Vision 2030.

Abdul Latif Jameel's Tokyo Visitors' Center is also given a more prominent position, while the site's multi-language capabilities reflect Abdul Latif Jameel's international audience of business and government influencers and respected position as a continuing champion of East-to-East trade opportunities.

All pages are mobile friendly and include media designed to offer a richer user experience, including enhanced search engine optimization and security.

Ali Haydar Bozkurt with the Toyota C-HR at the IAA Frankfurt

Toyota expects 25 years of hybrid success in Turkey

The CEO of Toyota Turkey, Ali Haydar Bozkurt, believes the country's hybrid vehicle sector can look forward to 25 years of growth, because power generation infrastructure is not yet ready for the widespread adoption of electric vehicles.

Speaking at the IAA International Motor Show in Frankfurt, Germany, in September, Bozkurt said: "According to research, the Turkish power distribution and generation system is unable to supply 60,000 electric vehicles simultaneously and can fail. It will take some time to rectify such infrastructure problems. Considering similar engineering data, the age of hybrid cars in Turkey will last for at least 25 years more."

The latest addition to Toyota's portfolio of hybrid cars was also unveiled at the motor show. The C-HR Hy-Power concept is a higher-powered engine version of the globally acclaimed C-HR model manufactured in Turkey.

Toyota now offers 16 different hybrid models in Europe, with seven different powertrain options. According to Bozkurt, 50% of the C-HRs sold in Turkey are hybrid, and 77% of those sold in Western Europe.

"Toyota is getting close to its target of 50% hybrid sales by 2020. As more environment friendly cars are included in the product range, this will help us to reduce carbon emissions by 90% by 2050 compared to 2010. Hybrid will be our distinguishing key feature. We will continue diversifying our hybrid product range even further."

As more environment friendly cars are included in the product range, this will help us to reduce carbon emissions by 90% by 2050 compared to 2010.

Inaugural J-WAFS fellowships support crucial water security research

As the world continues to battle against the double threats of climate change and global food and water shortages, only long-term action and investment can resolve some of the biggest challenges humankind has ever faced.

The Abdul Latif Jameel World Water and Food Security Lab (J-WAFS) recognizes the severity of the situation. In doing so, it has awarded fellowship financing to three researchers from the Massachusetts Institute of Technology (MIT).

Each researcher is currently studying for a PhD, with their doctoral projects aiming to develop innovative new methods to enhance water security and quality in the world's driest regions. Through three fellowships – the Rasikbhai L. Meswani Fellowship for Water Solutions (which makes two awards) and the J-WAFS Graduate Student Fellowship Program – J-WAFS will support their efforts during the 2017-2018 academic year.

Since its launch in 2014, J-WAFS has worked tirelessly to promote, coordinate and lead research related to water and food that will have a measurable and international impact.

Earlier this year, the fellowships attracted numerous high quality student applicants, reflecting the breadth of student research in water and water supply being performed on campus.

The three projects chosen to receive fellowships were:

- Working to design engineering infrastructure that minimizes the supply planning uncertainties – including rainfall, population and climate change – across Saudi Arabia, Kenya and Australia (Sarah Fletcher).
- Building the necessary knowledge to support nanotechnology development that could ultimately deliver more efficient, sustainable and cost-effective desalination (Omar Labban).
- Developing genetically engineered microbes that could cheaply and effectively be used as water quality sensors (Tzu-Chieh Tang).

The selected students exemplify the creativity, excellence, and rigor for which MIT is renowned. In recognizing the final three successful projects, J-WAFS has again underlined its commitment to making a material and sustainable difference to the world's future.

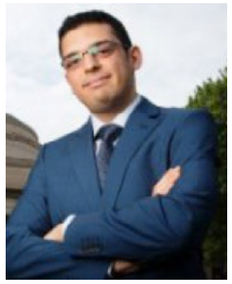
Keeping the taps running

The first Rasikbhai L. Meswani Fellowship for Water Solutions was awarded to Sarah Fletcher, a PhD student at MIT's Institute for Data, Systems and Society. She is also affiliated with the Joint Program on the Science and Policy of Global Change.

Sarah's previous education includes an undergraduate degree in physics and economics from the University of Pennsylvania, before she completed her masters degree in technology and policy at MIT. This latest fellowship will support Sarah's research on sustainable water resource system planning during 2017/2018.

In countries like Australia, Kenya and Saudi Arabia, water is a scarce resource. Sarah aims to develop water supply planning tools that will help governments and other authorities meet their people's needs for water. She hopes to build a framework that will model and manage the uncertainties faced by water supply planners, including inconsistent rainfall, population growth, and climate change. She will also evaluate the potential for the design of proactive, flexible engineering infrastructure and policy to minimize the risks posed by those uncertainties.

It is a complicated project, but Sarah's multi-disciplinary background should prove beneficial. She has experience of working across systems engineering, hydrology and public policy, as well as analyzing complex problems and presenting potential solutions in clear, easy-to-understand formats.



Towards more affordable desalination

The second Rasikbhai L. Meswani Fellowship for Water Solutions was awarded to Omar Labban, a PhD student at MIT's Department of Mechanical Engineering, in support of his research into how and why nanofiltration can improve reverse osmosis technology for desalination. Omar also holds masters (MIT) and undergraduate (American University, Dubai) degrees in mechanical engineering.

Desalination remains one of the world's most popular solutions in the fight against water scarcity, with around 70% of the world's current desalination capacity in the Middle East. However, its reliance on high energy consumption, often from sources like traditional fossil fuels, and the associated environmental impact, means it is also responsible for fueling other problems. Worldwide, desalination is believed to emit 76 million tons of carbon dioxide each year. By 2040, that figure is set to treble.

Omar's research involves three main tasks. He will investigate separation efficacy and thermodynamics; system design and economics; and membrane fouling and scaling. Through his work, he hopes to contribute to the development of nanotechnology that can ultimately be used to create more efficient and sustainable desalination procedures.

Shining a light on water quality

Tzu-Chieh Tang, a PhD student in MIT's Department of Biological Engineering, is the third researcher to receive a J-WAFS fellowship, as part of the 2017-2018 J-WAFS Graduate Student Fellowship Program. Tzu-Chieh is a former student at the Masdar Institute in Abu Dhabi and National Taiwan University.

He currently works as a research assistant in MIT's Synthetic Biology Group in the Research Laboratory of Electronics (RLE), and the Mediated Matter research group at the MIT Media Lab.

Ensuring suitable water quality levels remains an ongoing challenge, but Tzu-Chieh hopes to revolutionize the practice. He is fascinated by biologically inspired engineering, and combines synthetic biology with materials design to build functional living materials that can sense, compute, memorize, and respond to environmental stimuli.

In a previous project, he was part of a team that incorporated microbes into wearable living materials which fluoresced when they encountered certain chemicals. He now hopes to develop accessible, cost-effective electrodes that can detect contaminants in water.

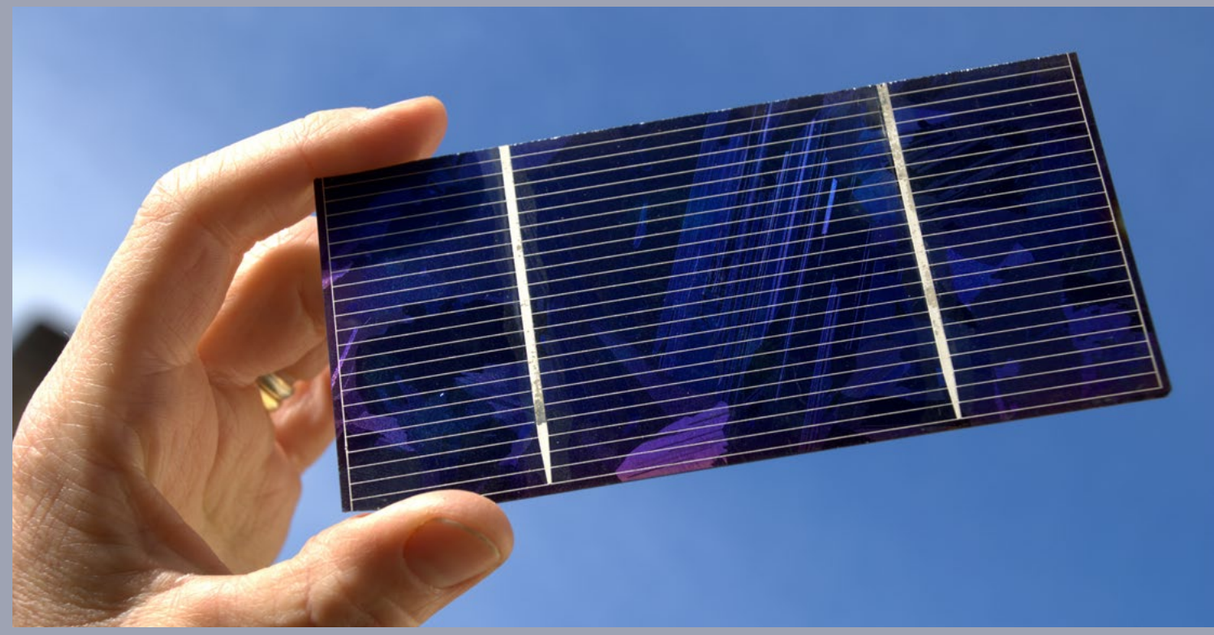
Joined-up thinking towards safer future for all

Each of these students follows in a historic tradition of pioneering food and water research at MIT. More than 120 years ago, Ellen Swallow Richards conducted research that led to Massachusetts establishing the first drinking water standards in America. She was followed by Samuel Cate Prescott, who developed quick-frozen foods, and John T. Dorrance, an MIT graduate who invented condensed soup.

By awarding these fellowships to the most promising water security research projects at MIT, J-WAFS continues to fulfil its original goal of bringing together the institute's unique strengths to help solve the unprecedented challenges of food and water security facing the world today.

Funding for Rasikbhai L. Meswani Fellowship for Water Solutions is provided by Elina and Nikhil Meswani and family. The J-WAFS Graduate Student Fellowship is supported by the J-WAFS Research Affiliate program. Xylem, Inc., has provided funding that supports this year's fellowship award. For more information about the J-WAFS Graduate Student Fellowship, visit www.jwafs.mit.edu.

J-WAFS Abdul Latif Jameel World Water and Food Security Lab



Cleaner energy for 40,000 homes in Jordan

Another 40,000 Jordanian homes are set to be powered by clean energy after Fotowatio Renewable Ventures (FRV) – part of Abdul Latif Jameel Energy – secured financing for its third major solar project in Jordan.

The European Bank for Reconstruction and Development (EBRD) and the Netherlands Development Finance Company (FMO) will provide a US$ 65 million loan for the development of the Al-Safawi solar plant.

The 51 MW plant, which is expected to generate 240 jobs during its construction, will spread over 170 hectares and use more than 200,000 crystalline photovoltaic (PV) panels.

The Al-Safawi plant follows Abdul Latif Jameel Energy's Mafraq I and II projects. When the Al-Safawi plant is complete, Abdul Latif Jameel Energy will supply 435 million kWh of electricity each year in Jordan, powering a total of 120,000 homes through clean energy.

"Abdul Latif Jameel Energy has been leading the way on developing solar projects in the region, and our work in Jordan is part of that.

"We remain committed to being the leading solar PV development company in the Middle East and beyond, and contributing to the generation of clean and affordable energy."

Roberto De Diego Arozamena, Chief Executive Officer of Abdul Latif Jameel Energy

BACK

VAT: securing the financial future of the GCC

As 2018 fast approaches, businesses across the Gulf Cooperation Council (GCC) are preparing for one of the biggest taxation changes to ever be introduced in the region - the introduction of VAT.

When the six member states of the GCC – Saudi Arabia, Bahrain, Kuwait, Oman, Qatar, and the United Arab Emirates – signed a VAT Framework Agreement in early 2017, they confirmed a new phase in the region's economic development.

VAT (Value-Added Tax) or its equivalent, Goods and Services Tax, or General Sales Tax (both often abbreviated to GST) is already common in most of the world's major economies. Of the United Nations' 193 member states, 153 (79%) have implemented VAT to date.

Globally, VAT rates range from 5% in Canada through to 25% in Portugal. The GCC's rates will match Canada's, with a 5% rate being introduced on goods and services.

The decision by the GCC to introduce its own VAT regime is seen as a significant step towards modernization, providing additional government revenue that both protects against instability in oil prices, and brings the region into line with other major economic blocs, such as the European Union and North America.

What is Value-Added Tax?
VAT is an indirect or general consumption tax placed on the sale of almost all goods and services. It was first used in France and Germany in the mid-20th Century. Today, the OECD believes it accounts for 20% of global tax revenues.[2]

In the GCC, some products will have zero VAT, such as medicines and medical equipment. Some services, too, such as the leasing of residential housing, are exempt from VAT.

Businesses involved in any part of a supply chain must actively collect VAT. A VAT system works by applying a tax to each transaction. Businesses selling goods or services impose and collect VAT charges from their customers (known as 'output tax'), while businesses buying goods or services pay VAT to their vendors or suppliers (known as 'input tax'). Most businesses will both pay input tax and collect output tax. The details of these transactions make up a business's VAT returns, with the balance of the output tax minus the input tax being the overall figure owed to the tax authorities.

Operational challenges
Although it is the final consumer who bears the ultimate cost of VAT, rather than the businesses in the supply chain, those businesses still act as collecting agents. This is one of the major appeals of VAT, as it reduces the administrative burden on the state and "cuts down on misreporting and tax evasion".[3]

However, the change will inevitably bring added uncertainty and operational challenges to businesses in the region. Ratings agency Fitch warned that the introduction of VAT in GCC countries "will create risks for companies and put pressure on performance and cash flows".[4]

In particular, it highlighted the costs associated with new training and procedures, reconfiguring IT systems, and the compliance costs of collecting and remitting the tax.

In addition, it noted that companies that supply goods and services between GCC members, or that operate within or between free zones, could face additional complexities, as agreements between individual GCC members could vary.

"VAT will provide our country with a new source of income which will contribute to the continued provision of high quality public services into the future. It will also help government move towards its vision of reducing dependence on oil and other hydrocarbons as a source of revenue."[1]

The UAE's Ministry of Finance

Khalid Ali Al Bustani, Director-General of Federal Tax Authority (Photo Credit Ahmed Kutty/Gulf News)

[1] See https://www.mof.gov.ae/En/budget/Pages/VATQuestions.aspx, accessed September 2017.
[2] VAT in GCC: Facts and Lessons, Dr Tarek Ghalwash, OECD, accessed September 2017
[3] VAT, United Arab Emirates Ministry of Finance, accessed September 2017
[4] Fitch: GCC Corporates Face Multiple VAT Challenges, February 16, 2017.

Implications for the business community
Saudi Arabian businesses are set to be the earliest in the GCC to face these challenges. The country is set to implement VAT from January 1, 2018, following approval of the implementation regulations in September by the Board of Directors of the General Authority for Zakat and Tax (GAZT), chaired by HE the Minister of Finance, Mohammed Al-Jadaan.

All Saudi businesses with annual revenues exceeding SAR 375,000 must register for VAT. Businesses with annual revenues between SAR 187,500 and SAR 375,000 have the option to register, if they wish. The deadline to register via the dedicated GAZT VAT website is December 20, 2017. Any companies that have not registered by then face a fine of SAR 10,000.

The 250 largest businesses in the country, already registered with GAZT for tax, are being registered automatically for VAT. Small businesses with turnover below SAR 1 million have an additional year to register, i.e., until January 1, 2019, to enable them to ensure they are VAT-ready.

The Governor of GAZT, His Excellency Suhail Abanmi, commented: "Businesses of all sizes have much to do to prepare for the introduction of VAT and GAZT is ready to support them through the process. Ensuring businesses understand the implications of VAT – and the steps needed to prepare – is a priority for GAZT."[5]

الهيئة العامة للزكاة والدخل
GENERAL AUTHORITY OF ZAKAT & TAX

Financial penalties will be imposed on companies who are not VAT compliant. In serious cases, such as tax evasion, businesses face fines of up to SAR 1 million, two years imprisonment and other criminal penalties – in addition to a 200 per cent penalty.

The threat of negative publicity, and the potential impact that could have on a business's investors and customers, is also expected to be a significant factor contributing to a widespread eagerness to ensure the transition to a VAT regime is as smooth as possible.

VAT-registered businesses will need to document in detail every transaction in which they are involved. They must also take steps to ensure they complete VAT returns as required, and that their cash flow is managed appropriately in order to make quarterly VAT payments.

A report by specialist VAT consultants, The VAT Consultancy, counsels that: "There is a systems challenge for corporates in terms of how they capture the correct information for reporting and invoicing. Certain GCC member countries rely on cheques and post-dated cheques as the main instruments for carrying out large corporate transactions in certain industries. Businesses will, therefore, need to fully understand the tax point rules and how to correctly book these transactions to ensure correct VAT reporting."[6]

VAT in Saudi Arabia
From January 1, 2018, all imports and supplies of goods and services in Saudi Arabia will be subject to VAT at the standard rate of 5%, although certain goods and services will be subject to zero rate or exempt.

Among the main exemptions[7] are:

- Financial services supply – Financial services supplies, including Islamic finance products, are largely exempt from VAT. Fees, commission or commercial discounts received by banks will be subject to VAT, however, life insurance is also exempt, but general insurance is not.
- Residential supplies – Residential real estate leasing or licensing (excluding hotels, inns, guesthouses, motels, serviced apartments or other temporary accommodation) are exempt from VAT.
- Medical supplies – Qualifying medicines approved by the Ministry of Health, or medical goods licensed by the Saudi Food and Drug Authority (SFDA), are zero-rated when dispensed for personal use.
- Government authorities – Government authorities are generally not required to register for VAT, unless they supply goods and services in competition with the private sector.

Some sectors are predicted to be influenced more than others by the new tax. According to a report by research consultancy Euromonitor International,[8] the large margins currently enjoyed by retailers in the region should allow them to absorb the extra cost without raising prices, protecting their sales revenues.

In contrast, the highly price-sensitive consumer appliances sector, for example, could be harder hit as retailers are limited as to how much they can absorb the cost of VAT.

Preparing for the introduction of VAT
Careful and diligent planning will be essential to ensure all necessary systems are in place before 2018, or businesses could face avoidable disruption.

At a basic level, they will need to design new invoices and reports that enable the completion of VAT returns. But there are also much more complex issues to tackle. In April 2015, Malaysia introduced VAT. Its businesses were faced with the same challenges as those now operating in the GCC, and their experience provides the most recent guidance for companies in the Middle East.

Some of the key questions that need to be considered by businesses in Saudi Arabia and the GCC include:

- Will existing IT systems need upgrading or modifying to process VAT?
- Would it be better to bring in an external company to manage VAT transition, or are there sufficient resources and expertise in house?
- Will the business face any adverse impact from the introduction of VAT?
- Do any long-term contracts need renegotiating to take account of the new tax regime?[9]

Only by acting quickly and decisively will businesses give themselves the time to overcome each of the challenges they face. It is a responsibility they must fulfil: the introduction of VAT across Saudi Arabia and the GCC is an important step on the path of economic modernization, advancing the country's Vision 2030 objectives and providing valuable income from which to fund vital public services.

In the short-term it will inevitably lead to some disruption, but looking ahead, it is another indication that the future prosperity of the region looks more secure than ever.

[5] https://www.gazt.gov.sa
[6] VAT in the Gulf region (GCC), The VAT Consultancy, 1 April 2017
[7] Please consult your tax advisor full details on exemptions.
[8] The Impact of the 2018 Value Added Tax (VAT) on the Food and Drinks Industry in UAE and Saudi Arabia, Euromonitor International, November 2016.
[9] An introduction to Value Added Tax in the GCC, PWC, January 2017

Ardabil Carpet – the world's oldest carpet

Art Jameel strengthens partnership with V&A

Art Jameel has strengthened its longstanding partnership with The Victoria and Albert Museum (V&A) in London, as part of its ongoing commitment to promoting art from across Saudi Arabia and the wider Middle East region.

The V&A will now maintain two major gallery spaces for art from the Middle East, as well as introducing five long-term curatorial posts across its jewelry and Middle East collections.

Among the exhibits enthralling visitors to the V&A's Jameel Gallery of Islamic Art, which is currently celebrating its tenth anniversary, is the Ardabil Carpet – the world's oldest carpet and one of its most historically important.

Fady Mohammed Jameel, President of Art Jameel, said: "Over the past decade, through our partnership with the V&A, we have achieved extraordinary recognition for artists."

"We are delighted to now extend our support further and play a role in building the V&A's remarkable scholarly programs for the future. This is part of our program to support the arts, in both the Middle East and around the world."

Art Jameel is a non-profit organization that supports arts, education and heritage in the Middle East and beyond. It recently announced a number of initiatives designed to strengthen its programs internationally, as well as announcing its first permanent space, the Jameel Arts Centre Dubai.

Innovative new finance app for Turkey's car buyers

Getting on the road for car buyers in Turkey is now quicker and easier than ever thanks to an innovative new e-contract process developed by Abdul Latif Jameel's finance arm in Turkey, ALJ Finans.

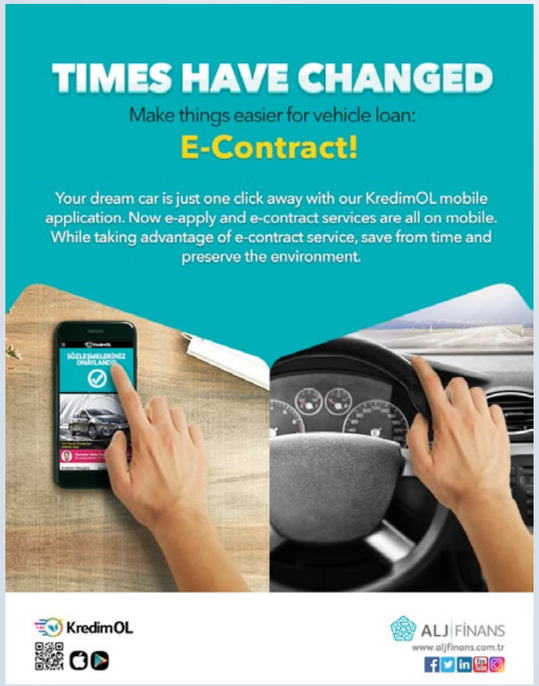
To get started, applicants need only their ID number and the ALJ Finans app – called KredimOL. They then choose their car, calculate their instalments, select their preferred dealer and complete their credit application. The result of their application is emailed to them in less than five minutes.

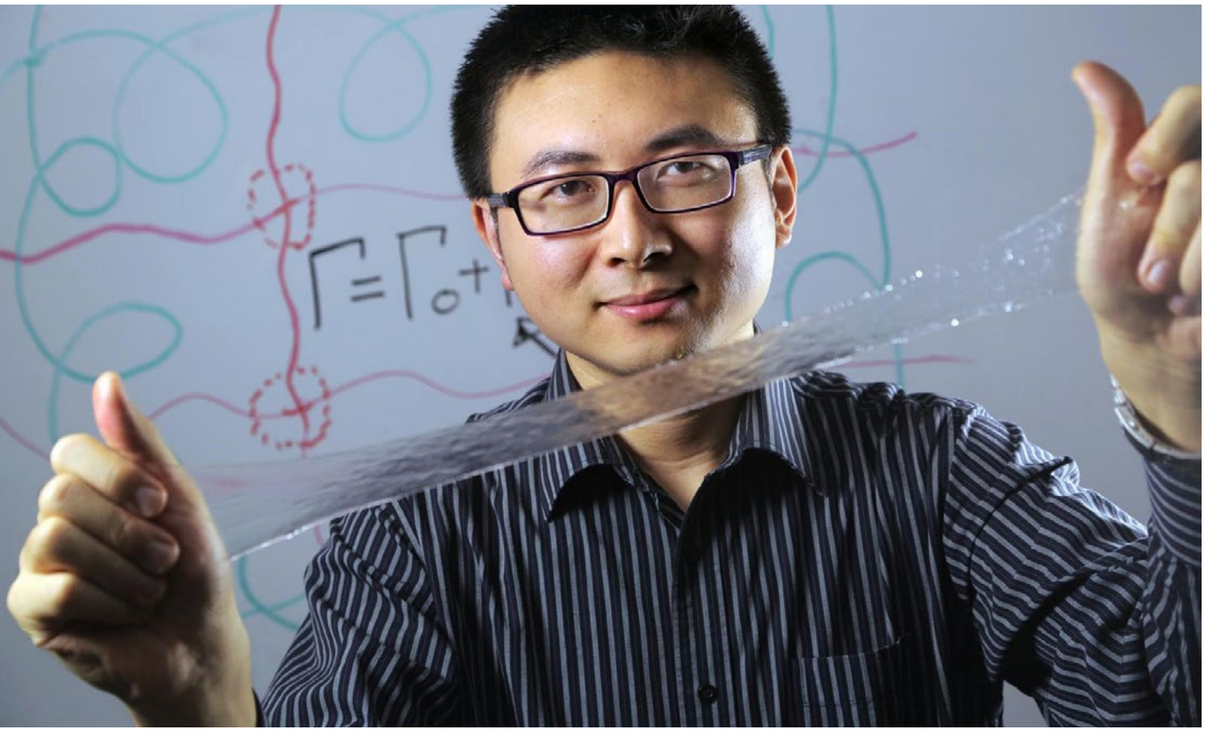
If approved, contracts and documents are sent through a bespoke electronic platform which was developed in just three months. All contracts and documents can be read and signed easily on mobile devices, eliminating the need for significant paperwork.

The 'e-contract' service is designed to support Abdul Latif Jameel's automotive business and is part of ALJ Finans' ongoing digitalization strategy.

Since the launch in June 2013, ALJ Finans continues to invest in its commitment to customer convenience, offering Turkish consumers.

As an important part of the digitalization strategy of ALJ Finans, mobility tools aim to enhance and complement the customer journey, through self-service and customized solutions which bridges customer need and operational process.





Xuanhe Zhao, Noyce Career Development Prof., Dept. of Mechanical Engineering, MIT.

J-WAFS in action:

Good vibrations – reducing the cost of water desalination

Xuanhe Zhao, Noyce Career Development Professor in the Department of Mechanical Engineering at MIT, and Dr. John Lienhard, Abdul Latif Jameel Professor of Water and Food at MIT and the Director of J-WAFS, are leading one of seven research projects awarded J-WAFS funding earlier this year. Xuanhe and John aim to develop a chemical-free, vibration-based membrane cleaning technology that could dramatically improve the efficiency – and reduce the costs – of reverse osmosis, the most widely used desalination process in the world.

Opening Doors spoke to professors Zhao and Lienhard about the project and its aims.

What is the title of your research project?

The project is called 'High-efficiency Chemical-Free Backwash Strategy for Reverse Osmosis Membrane Antifouling'.

What issue are you seeking to address?

Fresh water is fundamental to our existence, but ensuring a stable, sustainable supply is a huge challenge, particularly in water-scarce areas like the Middle East and North Africa (MENA).

In theory, there is enough fresh water on Earth to support seven billion people, but a combination of uneven distribution and inefficient consumption patterns mean that an increasing number of regions are chronically short of water, with vast volumes being wasted, polluted or unsustainably managed.

According to World Bank data, more than half of the population in MENA live under conditions of 'water stress', where demand outstrips supply[1]. Although this is perhaps not surprising in an area containing 12 of the world's most water-scarce countries, the scale of the difference between supply and demand is alarming.

With the pressure on water supply set to increase yet further as population growth and the effects of global climate change take their toll, water availability per capita in the MENA region is expected to halve by 2050.[2]

There are several technologies in use around the world that use desalination technologies to increase the supply of fresh water. The UAE, for example, gets 90% of its water through desalination.

The most widely used process globally is reverse osmosis. Our research aims to develop new technology that will significantly improve the efficiency, enhance the sustainability and reduce the costs of the reverse osmosis process.

What is reverse osmosis?

Reverse osmosis is used for both brackish groundwater desalination and for seawater desalination. It is also used as an element of wastewater reuse systems and in a variety of other processes.

During reverse osmosis, saline water is pressurized on one side of a polymer membrane, causing water to pass through the membrane to the low pressure (pure water) side. Salts cannot pass through the membrane because of the carefully designed surface chemistry of the membrane.

[1] High and Dry: Climate Change, Water and the Economy, World Bank, May 2016.
[2] http://blogs.worldbank.org/arabvoices/numbers-facts-about-water-crisis-arab-world

What are some of the problems associated with it?

The main problem we are interested in is fouling of the membrane. In operation, thin films of biologically active material can form on the saltwater side of the membrane. In addition, salts can crystallize on the membrane surface. Both processes effectively 'clog up' the membrane, which decreases the transfer of water from one side to the other and leads to higher energy consumption and costs. So, it's very important to control it.

The problem of biofilm membrane fouling is usually addressed by extensive chemical pre-treatment of the incoming feed water. But this is costly, time and energy-inefficient, and environmentally undesirable. In addition, it doesn't totally eradicate membrane fouling and it constrains the lifetime of membranes. It would, therefore, be preferable to have a chemical-free method that further extended the working life of the membranes and reduced operating and maintenance costs.

How does your research propose to overcome these challenges?

The approach that we are researching is to use pressure to vibrate the membranes. Bacteria use something called 'quorum sensing' to determine whether there are enough of them to form a colony. The vibrations interfere with the 'quorum sensing' and prevent the bacteria developing into biofilms.

The vibrations are produced by applying a pressure gradient to one side of the membrane. On the other side, the pressure is constant. The difference between the oscillating gradient on one side and the constant pressure on the other side causes the membrane to vibrate. This can be done during the regular desalination process.

We need to conduct further study in the lab into how bacteria adhere to the membrane surface and how vibration affects communication between bacteria. Once we've done that, we can look to apply these principles in the real world.

What are the potential benefits of your technology?

The main benefits are in reduced maintenance and operating costs of the reverse osmosis process. Less downtime is required to clean the membranes, as they are not fouled with biofilm, so productivity is greater: you can produce more water in a given period of time if you don't have to shut down the process for cleaning. At the same time, you avoid the costs involved in the cleaning process itself. Eliminating membrane anti-fouling also makes it easier for reverse osmosis to work with the very saline, warm water you find in the Gulf and other parts of the world.

There should also be a benefit for consumers, in the that it should lower the cost of water. Currently, operating and maintenance costs account for about a quarter of the cost of water from a reverse osmosis plant. Membrane cleaning and replacement are a significant contributor to that. So, if we can reduce those costs, the overall cost of production should come down significantly.

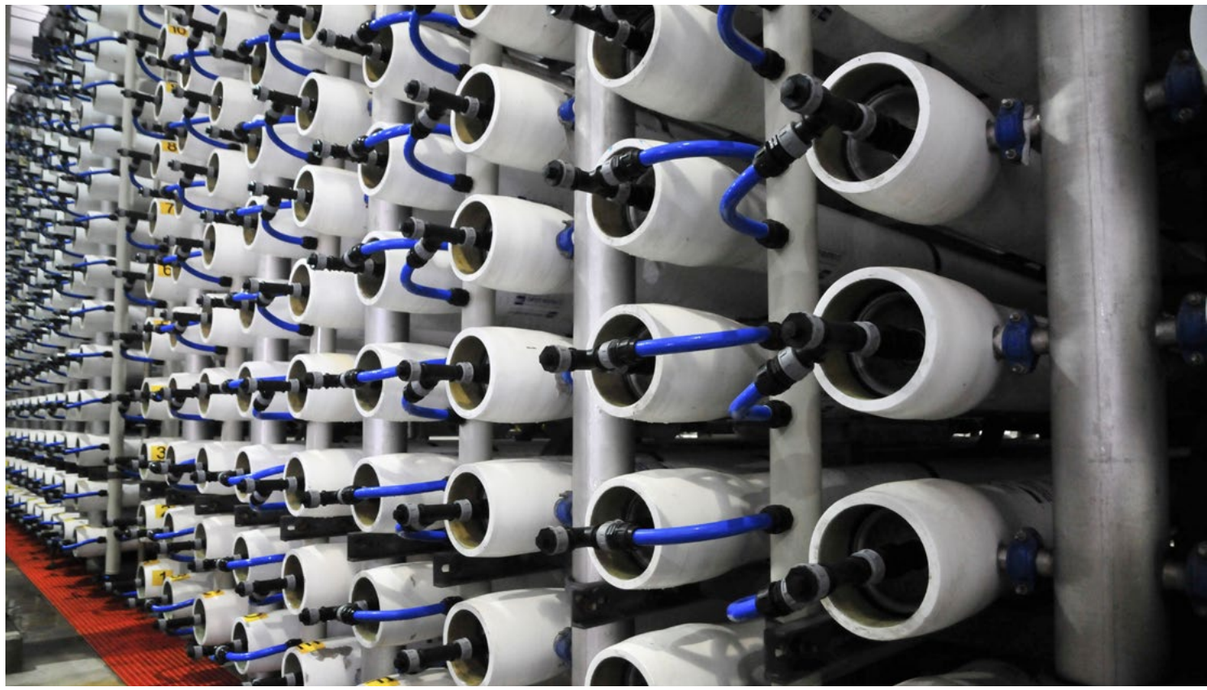
There will also be less risk of perforated membranes or something getting through, so the quality of the water is probably going to be better, as well.

Do you expect to have completed your research by August 2019, when this round of J-WAFS funding comes to an end?

Yes, we think this stage of the research – to prove the hypothesis – should be complete. After that, we see the potential for further research to refine the process and how it can be applied commercially.

The initial focus of our project is anti-fouling of reverse osmosis membranes, but the scope of our research and the knowledge we obtain could also be applied to other applications where bio-fouling is a problem, such as the hulls of ships, or medical implants, so there is significant commercial potential.

Dr. John H. Lienhard V, PhD, PE, Abdul Latif Jameel Professor of Water and Food at MIT and the Director of J-WAFS



A bank of reverse osmosis desalination membranes

New hope for global water and food systems

Five new technologies – including a low-cost water filter using wood, and a handheld device to test milk quality – are among those under development by the Abdul Latif Jameel World Water and Food Security Lab (J-WAFS) Solutions Program at the Massachusetts Institute of Technology (MIT).

Since its inception in 2014, J-WAFS has worked to develop and deploy technologies, policies, and programs that tackle challenges in the world's water and food systems. This year, its projects include:

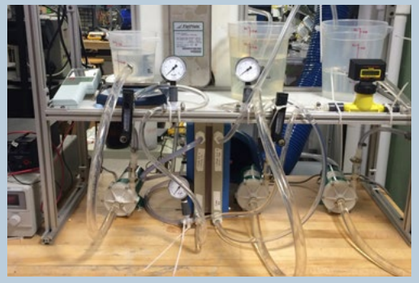
- Developing a low-cost water filter using wood, to provide low-income households with safe and affordable access to clean water.
- Using electrically-charged polymers to reduce the amount of pesticides sprayed on crops – potentially by more than 50%.
- Using smartphone technology to detect harmful bacteria in food, so food testing can be faster, cheaper and conducted on-site – preventing widespread foodborne illnesses.
- Developing a handheld device to test milk quality, ensuring the safety of milk production in increasingly complex dairy supply chains.
- Increasing the efficiency of irrigation waters to meet crop nutrient requirements by selectively removing ions that are harmful to crops while retaining those that are beneficial.

Fady Mohammed Jameel, President of Community Jameel International, said: "The research we are supporting at MIT has the potential to make a real difference to some of the most vulnerable people in the world."

The United Nations estimates almost 10% of the world's population falls ill each year from eating contaminated food, resulting in 420,000 deaths annually.

J-WAFS Solutions xylem technology

J-WAFS Solutions - a dairy farmer and collection operator at a milk collection center at Village Navli, Maharashtra, India.



J-WAFS Solutions - tests of the Intelligent Selective Electro-dialysis (ISED) system being conducted in the Lienhard lab.

Antoine Allanore, Assistant Professor, Department of Materials Science and Engineering at MIT (Photo credit MIT)

J-WAFS in action:

Rocks for Crops – Delivering affordable potassium fertilizer across Africa

Antoine Allanore, Assistant Professor in the Department of Materials Science and Engineering at MIT, is leading one of seven research projects recently awarded J-WAFS funding. Antoine aims to develop a new kind of potassium fertilizer derived from K feldspar, a widely available mineral that can be produced locally, rather than relying on expensive supplies of imported potassium chloride.

Opening Doors spoke to Professor Allanore about the project and its aims.

What is the title of your research project?
The project is called 'Affordable Potassium Fertilizer from K Feldspar for Africa'.

What issue are you seeking to address?
The United Nations forecasts a global population of 8.5 billion by 2030 – increasing 1.2 billion in just 15 years from 2015 – and hitting 9.7 billion by 2050. These growth rates are already startling, but even more so when you consider much of this is expected in the parts of the world already struggling to meet the food and water needs of their current population today. The UN Food & Agriculture Organization (FAO) predicts that, with 33% more mouths to feed by 2050, food production will have to increase by 70% – so we need to look at ways to grow more food, more efficiently. Fertilizer is one way to increase yield, but in countries where there is most need, imported solutions are very expensive.

Today, Canada, Russia and Belarus account for more than 85% of the world's production of potassium chloride (KCl), which is the most widely used compound for potassium fertilization in agriculture. While supplies are cheap and easily available for countries in the northern hemisphere, transportation logistics ensure KCl is expensive and scarce in the southern hemisphere. At the same time, soils in the southern hemisphere and the tropics have a different make-up to soils in the north. This means that KCl is not as effective for fertilization in these areas. So, we are aiming to develop a new potassium fertilizer derived by hydrothermal processing of potassium feldspar – a widely available mineral across the globe, including Africa - in the presence of calcium oxide. This could be particularly useful to tropical

[1] http://www.un.org/en/development/desa/news/population/2015-report.html
[2] http://www.fao.org/news/story/en/item/35571/icode/
[3] the science of soil management and crop production

agriculture across North Africa, where 1) potassium chloride transportation costs are prohibitively high, 2) the soils are not so well suited to potassium chloride fertilizer and 3) potassium feldspar (K feldspar) is readily available.

Why has potassium chloride traditionally been the most widely used compound for potassium fertilization?
By the end of the 19th century, agronomists had discovered a link between soil types and certain elements in the ground. But until the discovery of salt mines in Germany, nobody really had access to high-potency potassium chloride. Suddenly Germany had easy access to potassium chloride – you didn't have to go very deep, it was almost at ground level. Then, at the turn of the 20th century, these mines were discovered all over Europe, Russia and North America, so potassium chloride became the main option for soil fertilization.

Can you briefly describe the benefits of your proposed solution?
Our proposal does not rely on the complex and costly supply chain of potassium chloride. Instead, we are using K feldspar, which is widely available almost anywhere. So rather than importing potassium chloride from Canada, Russia or Germany, we can use local resources and develop the local industry. At the same time, because it is being produced locally, it should be possible to tweak the process to ensure that the end-product is more suitable for local soil conditions.

This creates a double benefit: you're helping farmers with a more effective fertilizer, and you're helping the economy by developing local industry. There's also a third potential benefit, in that countries in Africa with readily accessible reserves of K feldspar could become producers and exporters of fertilizer, like Russia, Germany or Canada are today. So it could open up new opportunities for mining, as well as production.

What are the key challenges you need to address?
We have to consider the complexity of soil science and agronomy . We are still at the beginning of understanding how our product will interact with other nutrients in the soil and crops. These farming complexities are what we hope to tackle, particularly in understudied regions.

The first thing we need to do is understand the type of soil in which we are going to use the product. Soils differ greatly around the world due to a range of reasons, from

Feldspars (KAlSi3O8 – NaAlSi3O8 – CaAl2Si2O8) are a group of rock-forming tectosilicate minerals that make up about 41% of the Earth's continental crust by weight. The salmon-pink color is typical of K-spar. Fragments of pure feldspar crystals tend to form rectangular blocks with irregular ends.

the amount of water they hold through to their different geological origins and, sometimes, previous use of the soil.

Africa, obviously, is a huge area, with different soils in each region. The crop being grown is another factor we must consider. Once we know the soil type and the crop, we will be able to tweak and design our material to ensure it is going to be able to perform according to the needs of the farmers.

This latest round of J-WAFS funding run until August 2019. Do you expect your research to be complete by then?
Realistically, I think we'll be able to complete 'greenhouse tests' by then. These are small scale tests on plants that replicate the conditions of the soil, of the crop and of the way the farmer grows it. The next stage will be to conduct field tests and soils tests on a slightly larger scale. If the research is successful, we'll be ready to conduct six-month or one-year field trials, which will allow people to see large-scale performance of the material. After that, we'll need to work with industry and commercial partners to scale the product and take it to market.

At a high level, this is a perfect chance to test our ability to adapt the fertilizer to new regions, although there will always be need for more research for us to fully understand the impact of our product on different crops and in different soil types.

A Service Advisor and Service Technician take a customer through the work on his vehicle at Abdul Latif Jameel Motors' Toyota dealership in QIngdao

Remarkable customer service results for Abdul Latif Jameel Motors' dealers in China

In a first half review by FAW Toyota Motor Sales (FTMS) assessment of its 541 strong dealer network, Abdul Latif Jameel Motors' China operations in Chengdu and Qingdao achieved some remarkable results.

The Chengdu location was rated number 1 out of 541 dealers in the categories of customer service, pre-owned vehicles and parts and accessories sales. Alongside this, the Qingdao location was also rated 6 out of 541 dealers for customer service.

Starting on January 2017, all Abdul Latif Jameel China locations engaged in a customer education and familiarization program, called '1st Time Service Experience' for those customers coming into service their Toyota for the first time. This activity is provides a deeper understanding to Abdul Latif Jameel Motors' guests of the very high standard service process they can expect from a Abdul Latif Jameel's 'Gold' certified Toyota dealers and emphasizes the importance of using genuine parts.

Guest '1st Time Service Experience' day at Abdul Latif Jameel Motors' Toyota dealership Chengdu

A war on waste and a spray that stays: J-WAFS cultivates innovation to address pressing food and agriculture problems

A coating that reduces food waste by increasing the shelf life of produce, and a spray that reduces pollution caused by pesticide run-off, are among two of the latest innovations to win recognition from the Abdul Latif Jameel World Water and Food Security Lab (J-WAFS), in the Massachusetts Institute of Technology's (MIT) second annual Rabobank-MIT Food and Agribusiness Innovation Prize.

Picking up first and second prizes respectively in the competition, supported by J-WAFS and sponsored by Rabobank, the two projects are the latest demonstration of J-WAFS' commitment to helping to address some of the globe's most pressing problems – problems that are expected to get even more severe over the coming decades, as the world struggles to support an ever-growing population.

By 2030, the United Nations predicts the global population will reach 8.5 billion, up from 7.3 billion in just 15 years from 2015, with a further 1.2 billion increase expected by 2050.[1] To cope with the additional pressure on resources created by this unprecedented population increase, World Bank's data[2] suggests that at least 70% more food production will be needed by 2050.

Addressing the growing waste problem

As well as increasing food production, more attention is also being given to reducing the amount of food that is wasted.

The Food and Agriculture Organization of the United Nations (FAO) estimates that, each year, one-third of all food produced for human consumption in the world (around 1.3 billion tons) is lost or wasted. This includes 45% of all fruit and vegetables, 35% of fish and seafood, 30% of cereals, 20% of dairy products, and 20% of meat.[3]

> One-third of all food produced for human consumption in the world is lost or wasted.

Although waste is highest in Europe and North America, it is also a significant and growing problem in the Middle East. Over 10 million tons of food is mobilized within the UAE each year, for example, including imports and local production. It is estimated that 3.27 million tons of this is wasted.[4]

During Ramadan in particular, food wastage is up to 25% higher than at other times. For example, in Bahrain, food waste exceeds 400 tons per day

[1] http://www.un.org/en/development/desa/news/population/2015-report.html
[2] http://www.fao.org/news/story/en/item/35571/icode/
[3] http://www.fao.org/save-food/resources/keyfindings/en/
[4] Global food losses and food waste, FAO, 2011.

during the holy month, and in Qatar almost half of the food prepared during Ramadan finds its way into waste bins, although many government and NPO initiatives are in place across the region to tackle this and redistribute food to poorer communities.

Food loss and waste has a significant impact on the environment. The global carbon footprint of wasted food is estimated at 3.3 gigatonnes.[5] In fact, if food waste were a country, it would rank behind only the United States and China for greenhouse gas emissions.

Against this background, the Rabobank-MIT Food and Agribusiness Innovation Prize saw seven finalists from MIT and other universities pitch their proposals to a panel of judges for a chance to win prizes totaling US$ 25,000.

Opening this year's awards ceremony, J-WAFS Director John H. Lienhard V, the Abdul Latif Jameel Professor of Water and Food at MIT, said the competition represents a major goal of J-WAFS: nurturing food and agribusiness start-ups. This is especially important with the global population increasing at an unprecedented rate. Linehard said:

> Food loss and waste has a significant impact on the environment. The global carbon footprint of wasted food is estimated at 3.3 gigatonnes.[5]

"We firmly believe the solution to many of these problems really is to create entities that will go out on their own, as businesses, and propagate new and good ideas."

Reducing food waste: shelf life

The winner of the US$ 12,000 first prize was a team from MIT-Tufts University called Cambridge Crops, which is developing a silk-based coating that extends the shelf life of fruits and vegetables by up to 50%.

The coating is 99% water and 1% silk fibroin – a protein similar to that found in the gland of a caterpillar. When the coating is applied to crops, the water evaporates, leaving a flavorless, edible silk film. This film reduces cell respiration and water evaporation, which can drastically slow ripening and spoiling of produce.

The technology is based on research at Tufts University by Benedetto Marelli, now the Paul M. Cook, Career Development Assistant Professor in MIT's Department of Civil and Environmental Engineering. The research shows that the coating can extend by 50% the shelf-life of strawberries, which generally have a shelf-life of fewer than 10 days. "We have technology that can dramatically reduce waste at every step of the value chain, for producers, distributors, and consumers," said Jacques-Henry Grislain, a member of the Cambridge Crops team.

The prize money will help fund the team's ongoing experiments that aim to ensure the coating is commercially viable. "We want to make sure we have the best and most efficient solution on the market," said Grislain.

Innovating to solve the pesticide pollution problem

Winning the competition's second prize of US$ 8,000 was Ecospray, which is developing a spray that helps farmers drastically cut pesticide usage, lowering costs and reducing pollution.

An estimated 600 million people – almost 1 in 10 people in the world – fall ill after eating chemically-contaminated food and 420,000 die every year, resulting in the loss of 33 million healthy life years, according to the World Health Organization.[6]

As with other regions of the world, the use of pesticides in the Middle East and North Africa has increased significantly in recent decades, as population levels have soared and the demand for food increased. So, too, have concerns over the impact of pesticides on pollution and health. Indeed, in 2017 both Saudi Arabia and the UAE banned the import of some fruits from Egypt due to concerns over pesticide residues on the fruit.

Maher Damak, a graduate student in mechanical engineering and a member of the Ecospray team, explained that farmers spend roughly US$ 100 billion on pesticides annually, yet only about 2% of pesticides sprayed on plants actually stick. The rest bounces off and flows into streams and rivers, causing pollution. About 200,000 people worldwide die from pesticide poisoning annually, according to recent reports from the United Nations.[7]

As plants are naturally hydrophobic (water-repelling), liquid pesticide droplets tend to bounce off the surface. Over the past four years, Damak and the Ecospray team, including MIT associate professor of mechanical engineering Kripa Varanasi, have developed a spray that applies two different additives to a pesticide. One additive produces a negatively charged droplet; the other, a positively charge droplet.

When the two combine on a plant, they form hydrophilic (water-attracting) bumps that catch the droplets. This retains 10 times more liquid, meaning only one-tenth the amount of pesticide needs to be used to have the same effect. "Our mission is to eliminate all pesticide waste, while saving growers tens of billions of dollars per year," Damak said.

The third-place prize of US$ 5,000 was awarded to WISRAN, innovative software that improves profits for farmers by analyzing, in real-time, the time, cost, and effectiveness of farming activities.

In total, 28 teams made submissions for the competition, from which the judges selected seven finalists. These were then paired with mentors to help develop their business plans and pitches, before the winning three submissions were chosen.

Samantha Fahrbach, president of the MIT Food and Agriculture Club which helped to organize the competition, said: "It's about bringing ideas to a place where they can get off the ground, and solidifying MIT as a place where food and agriculture innovation happens."

[5] Food wastage footprint: Impacts on natural resources, summary footprint, FAO, 2013.
[6] Food Safety Fact Sheet, No. 3999, World Health Organization, December 2015.
[7] Report of the Special Rapporteur on the Right to Food, UN General Assembly, March 2017.

Entries open for MITEF Saudi competition

Prizes of up to SAR 220,000 (approximately US$ 60,000) and specialist guidance, workshops and training are available as part of the latest MIT Enterprise Forum (MITEF) Saudi Arabia competition, in partnership with Bab Rizq Jameel.

Under this year's theme of 'Create your tomorrow', the competition celebrates Saudi Arabia's most innovative business minds and helps the country work towards its Saudi 2030 Vision.

Saudi Arabian entrepreneurs are being encouraged to enter in one of three categories: ideas, startup, and social enterprise. Entrants who advance to the competition's final stages will have the chance to take part in the Saudi StartSmart Forum, a MITEF program designed to encourage, motivate, and guide entrepreneurs to success.

For more details, visit **www.mitefsaudi.org**. The competition is open until November 25, 2017, with the winners to be announced at an awards ceremony on March 3, 2018.

"As Saudi Arabia actively encourages the growth of entrepreneurship, competitions such as MITEF Saudi Arabia are a platform for real change and give budding entrepreneurs the chance to contribute to our country's future.

"MITEF Saudi Arabia and Community Jameel are proud to support entrepreneurs who are keen to contribute to a stable, diverse, and sustainable economy."

Fady Mohammed Jameel, President of Community Jameel International

A major new cultural development for the Middle East: Work begins on Jeddah arts center

Construction work has begun on the first major center for the creative arts in Saudi Arabia, which is being developed and funded by Art Jameel.

The 17,000m2 development in the north of Jeddah will include art galleries, a theatre, rehearsal and events spaces, cafes and a restaurant, and a central outdoor courtyard for performances and screenings.

The construction started in July 2017 after Art Jameel was granted approval from Jeddah Municipality. Once complete, the center will act as an incubator for artists, photographers, musicians, filmmakers, and creative engineers.

Fady Mohammed Jameel, President of Art Jameel, said: "In March we said that Art Jameel is embarking on a new phase of development – strengthening our programs in Saudi Arabia and across the world. This new incubator in Jeddah – our home – is part of that journey and will be followed, in the future, with other incubators in different cities of the Kingdom.

"We would like to thank Jeddah Municipality, the General Entertainment Authority, and all the government authorities for their help in making this happen and their enthusiasm for this landmark project."

The center will also feature world-class exhibitions from both Saudi and international artists.

Real people, real stories – Creating the right culture

For talented employees, finding the right working environment and having a clear progression path are both crucial. That's why Abdul Latif Jameel invests time, energy and resources into creating a warm and rewarding working environment in which all team members have the opportunity to shine.

Mouhannad Makhlouf, Director of Business Development at Abdul Latif Jameel Energy, grew up in Damascus, Syria, before immigrating to the United States. After studying for an MSc in Telecommunications Engineering at The George Washington University in Washington, D.C., he embarked on a 17-year career with some of the country's leading Fortune 500 companies.

He returned to the Middle East in 2009, and now works in Abdul Latif Jameel's Dubai offices, where he sees a family spirit and a willingness to recognize hard work as key factors in the group's ability to attract some of the world's leading talent.

Watch video here

VIDEO

"The culture is what separates Abdul Latif Jameel and marks it out among the world's most successful companies. I've been fortunate to work for some of the biggest companies in the United States, but the supportive environment and family feel I've experienced at Abdul Latif Jameel is on a completely different level.

"I now work in Abdul Latif Jameel's offices in Dubai, and it's a special place for both myself and my family. At work, there are so many opportunities for growth. If you work hard, your efforts are quickly recognized – but you never need to sacrifice that important work/life balance.

"Outside of work, the UAE is a wonderful place to raise a family. My wife and children are safe. There are so many things to do in the area, so we're always having fun and making memories that will last a lifetime."

Global experts gather for J-WEL launch

MIT President, L. Rafael Reif (left) and Fady Mohammed Jameel, President of Community Jameel International (right) announce the new Abdul Latif Jameel World Education Lab (J-WEL) at MIT.

Education professionals from 27 countries gathered at the Massachusetts Institute of Technology (MIT) in October to discuss the future of education and learning, as part of the inaugural J-WEL Week.

J-WEL Week is the first initiative of the Abdul Latif Jameel World Education Lab (J-WEL). The four-day event included lectures, presentations and workshops focused on the three pillars of lifelong education: primary and secondary education, higher education, and workplace learning.

Visitors travelled from South America, Australia, the Middle East, Far East, and Europe for the event, which was themed around 'The Power of Problem Solving'.

J-WEL, a joint venture between Community Jameel and MIT, was founded in May 2017. It aims to help people around the world fulfil their potential by transforming education and learning at all levels and ages. It seeks to strengthen knowledge transfer and development, and equip individuals with the skills and abilities needed for the modern workplace.

Fady Mohammed Jameel, President of Community Jameel International, said: "Education and learning are fundamental to development, building strong and diversified economies, and creating opportunity and prosperity for all.

"Through J-WEL, we want to bring together experts from across the education space, gathering perspectives, knowledge and experience to address the challenges facing learning at all levels, and to develop real, workable solutions. The inaugural J-WEL Week is the first step in this process, and we are delighted with the high level of engagement in the initiative."

J-WEL Weeks are signature, goal-oriented programs that provide members with first-hand access to MIT's educational resources and practice. Two distinct J-WEL Weeks are run per year, each thematic, and comprising multiple modules. Members address challenges in their organizations, by defining goals and considering next steps that will allow implementation.

Each J-WEL Week is a connected learning and exploration journey for participants. Most importantly, J-WEL Weeks will develop a close collaborative network of innovators able to impact education on local and global scales.

J-WEL Weeks set the stage for 'deeper dive' J-WEL Exchanges—bootcamps and workshops focusing on key topics in education, as well as for specific membership programs including those for innovative institutional design.

J-WEL is part of MIT's broader ongoing collaborations between Community Jameel and MIT, including the Abdul Latif Jameel Poverty Action Lab (J-PAL) and the Abdul Latif Jameel World Water and Food Security Lab (J-WAFS).

Bab Rizq Jameel finds jobs for almost 20,000 Saudis

Almost 20,000 Saudi Arabian nationals have been helped into employment by Bab Rizq Jameel Recruitment during the first half of 2017.

Since the start of the year, Bab Rizq Jameel Recruitment, which is part of Community Jameel, has found jobs for 10,027 women and 8,436 men. Its efforts are designed to support Saudi Arabia's Vision 2030, which aims to increase the number of Saudis working in the private sector.

Rola Basamad, Senior General Manager of Bab Rizq Jameel Recruitment, said: "Helping people find meaningful employment is our primary function and the very reason for our existence.

"There is a great interaction between private companies, the decisions of the Ministry of Labour and Social Development, and Bab Rizq Jameel's database of potential applicants. The database includes large numbers of graduates from universities and colleges of technology, with registrations increasing by about 50% since last year."

More than 8,000 of the new jobs were in Saudi Arabia's western region, followed by 3,760 roles in the central region and 3,072 positions in the eastern region.

Basamad added: "Our streamlined registration system enables applicants to register online without having to visit the branch in person, resulting in an even larger catchment of male and female job-seekers across Saudi Arabia and helping more people join the workforce and contribute to local economies across the country."

BAB RIZQ JAMEEL

New materials handling facility gears up for success

Abdul Latif Jameel Machinery's materials handling arm, has opened its first sales, service and spare parts (3S) showroom in a ceremony attended by the Vice President of Sales and Marketing of Toyota Material Handling International, Yoichiro Yamazaki.

The Jeddah facility, which was opened in July 2017, aims to sell 600 units per year through its 11-strong sales team. As a sign of its early success, 39 towing tractors were delivered to Saudi Airlines in September.

It also provides a spare parts delivery service stretching from Tabouk to Al Qonfozah, and operates 10 mobile workshops.

Abdulrazig Eltayeb, Acting Director of Abdul Latif Jameel Industrial Equipment, is keen to drive forward with further developments in the coming years. In 2018, the Jeddah facility will expand its range of electric vehicles, and roll-out a long and short rental service across its full range of vehicles. It also aims to offer a range of used forklift trucks by 2020.

Abdul Latif Jameel MACHINERY

Artist's impression: the Gallery N residential development at Al Nahdah, Jeddah, Saudi Arabia

Breaking ground on a second residential development

Following the success of the flagship showcase J | ONE residential complex, at Al Salamah Jeddah. Abdul Latif Jameel Land announced the start of construction for their second residential project in Saudi Arabia – Gallery N - located in the Al Nahdah district of Jeddah.

The project of 21 contemporary apartments, broke ground in August 2017 and planned to be completed in 12 months.

This new project, is being developed by the company's real estate development company, Abdul Latif Jameel Land, which has experience in developing residential projects on fast track construction programs, is another showcase of the company's essential pillars for contributing to addressing the rising demand for modern homes in Saudi Arabia: speed of build, no compromise on quality, contemporary design and affordable pricing.

Gallery N will be offered to the market for sale in late 2017 and will be followed with a growing pipeline of residential developments.

The projects modern architectural aesthetic incorporates environmental sustainability by design from the outset, and has already been nominated for international design awards for 'best residential building design'.

Events round-up

Here's a brief round-up of some of the main business events in the region recently.

8th Annual World Infrastructure & Energy Summit
Barcelona, Spain
September 28, 2017
www.euromoneyseminars.com
Almar Water Solutions and its Chief Financial Officer, Felipe Guinea, participated in the 8th Annual World Infrastructure & Energy Summit (WIES). The event was held at the Fira Center in Barcelona, establishing itself as the world's largest event to identify new projects in the infrastructure market and discover investment and financing opportunities. Felipe moderated a session titled "A global perspective: Confronting the critical investment gap in water infrastructure", where the following questions were analyzed:

- Prioritizing investment in water: What fields require an increased focus on development: supply, water treatment or desalination?
- Is the PPP model the best framework for mobilizing joint investment in water infrastructure by the public and private sectors? How might this vary in different parts of the world?
- How can we integrate and take advantage of the analytical advantages of 'smart' technology in the development of water infrastructure?

During the session, Felipe discussed how the sector is a safe bet for both private and public investment and explained how the BOT or PPP schemes represent effective tools for project financing, and a real solution in the fight against the water shortages that many areas of the world are experiencing.

Middle East Solar Association Renewable Energy Trade Mission
Riyadh, Saudi Arabia
October 3-4, 2017
www.mesia.com
Roberto De Diego Arozamena, Chief Executive Officer, ALJ Energy, participated in a number of panel discussions.

Kingdom Renewable Energy Summit
October 18-19, 2017
www.kingdom-renewableenergy.com

Future Investment Initiative
The King Abdul Aziz International Conference Center Riyadh, Saudi Arabia
October 24 – 26, 2017
www.futureinvestmentinitiative.com

International Desalination Association World Congress 2017
São Paulo, Brazil
October 28, 2017
www.wc.idadesal.org

META Projects 2017
November 1, 2017
www.gfcmediagroup.com
Carlos Cosin, Chief Executive Officer, Almar Water Solutions speaking.

World Science Forum
Jordan
November 7-11, 2017
www.worldscienceforum.org

Tokyo Motor Show
Tokyo Japan
November 23–27, 20177
www.tokyo-motorshow.com

7th Saudi Arabia Smart Grid and Renewable Energy Conference
December 12-14, 2017
www.saudi-sg.com

Saudi International Motor Show 2017
Jeddah, Saudi Arabia
December 17-21, 2017
www.sims-arabia.com

World Future Energy Summit
Abu Dhabi, United Arab Emirates
January 15-18, 2018
www.worldfutureenergysummit.com

World Economic Forum Annual Meeting
Davos-Klosters, Switzerland
January 23-26, 2018
www.weforum.org

Saudi Renewable Energy Conference
Riyadh, Saudi Arabia
February 14-15, 2018
www.renewableenergyksa.com

Abdul Latif Jameel