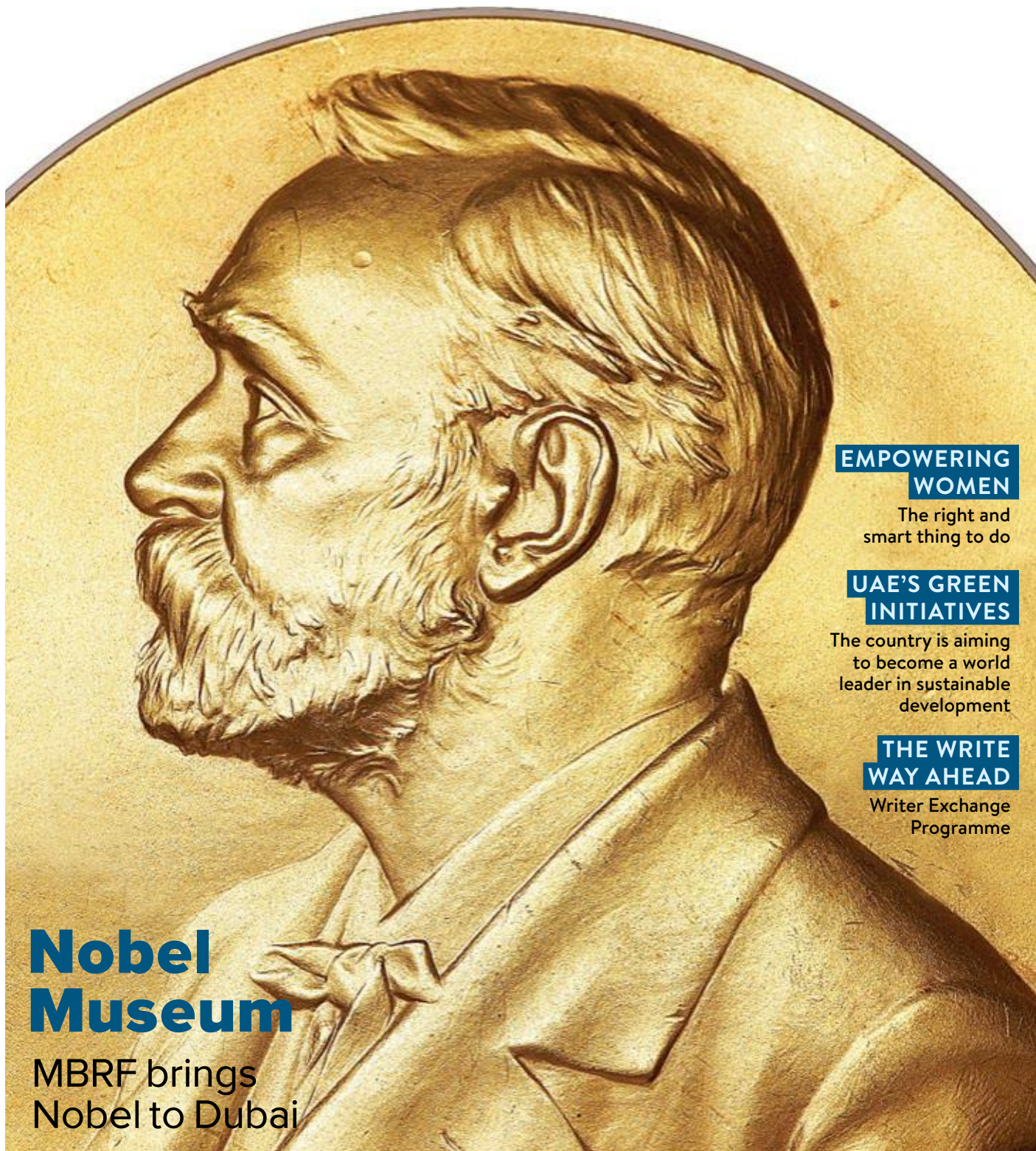


FLASHES

A MONTHLY MAGAZINE ON KNOWLEDGE AND DEVELOPMENT
BY THE MOHAMMED BIN RASHID AL MAKTOUM FOUNDATION

MAR 2015



EMPOWERING WOMEN

The right and smart thing to do

UAE'S GREEN INITIATIVES

The country is aiming to become a world leader in sustainable development

THE WRITE WAY AHEAD

Writer Exchange Programme

Nobel Museum

MBRF brings Nobel to Dubai



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Member of MBRF Holding

CHAIRMAN

HE Jamal Bin Huwairb

CORPORATE

AFFAIRS ADVISOR

Saif Al Mansoori

**MARKETING AND
COMMUNICATIONS
DIRECTOR**

Lina Al Anani

Mohammed Bin Rashid
Al Maktoum Foundation
T: +971 4 4233 444
F: +971 4 368 7777
PO Box 214444, Dubai
United Arab Emirates
www.mbrf.ae
flashes@mbrf.ae



MOTIVATE

A Motivate
Connect Publication

Media 1 Tower,
Dubai Media City
PO Box 2331, Dubai, UAE
T: +971 4 427 3000
F: +971 4 428 02261
motivatepublishing.com
connect@motivate.ae

PUBLISHER

Chris Capstick
chris@motivate.ae

SENIOR

ASSIGNMENTS EDITOR

Ingrid Valles

CONTRIBUTOR

Nusrat Ali

HEAD OF PRODUCTION

Sunil Kumar

Printed by Rashid Printers



FOREWORD

At the Government Summit held last month, Ban Ki-moon, Secretary-General of the United Nations, gave his seal of approval to Dubai's low carbon development. Meanwhile, Sheikh Hamdan bin Mubarak Al Nahyan, Minister of Higher Education and Scientific Research, launched the Green Economy – Innovation and Sustainability Award as part of the objectives of the national initiatives launched by the UAE leadership to build a competitive, knowledge-based, green, and sustainable economy. "The award is an embodiment of the initiative of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, which was launched in January 2012 under the slogan, 'Green Economy for Sustainable Development', to make the UAE one of the world leaders in this area," Sheikh Hamdan bin Mubarak Al Nahyan said at the launch.

These developments show how seriously the UAE takes its commitment to embracing a green and sustainable economy. And our commitment is not just in words, but in actions too.

Recently, His Highness Sheikh

Mohammed bin Rashid said the UAE is keen to empower women by encouraging them to assume leadership positions. He praised the achievements of Emirati women in the public sector where they make up 66 per cent of the federal workforce. Our country's leadership has always recognised that women are important partners in the building of the nation; their participation, both in the workforce as well as in the government sector, is vital for lasting success and prosperity. The global Social Progress Index 2014 ranked the UAE as number one in the world for treating women with respect.

Education and dissemination of knowledge is the world's priority. Online resources are helping bridge the gap between teachers and those keen to learn. One such initiative is Khan Academy. What started as a simple home tutorial has now grown into a massive organisation helping millions learn. These are the kind of revolutionaries our world needs today.

HE Jamal Bin Huwairb

MD of the Mohammed Bin Rashid
Al Maktoum Foundation

FOUNDATION UPDATES AND INITIATIVES



Clockwise: Liwa, Hatta Cultural Village,
Burj Khalifa, Dubai Museum, Al Fahidi Fort



THE WRITE WAY AHEAD

The UAE will form the setting for four new Japanese novels thanks to the Writer Exchange programme hosted by the Mohammed Bin Rashid Al Maktoum Foundation (MBRF). Four award-winning Japanese writers spent nearly three weeks in the country studying its lifestyle, social values, culture and heritage.

From modern icons like Burj Khalifa and Palm Jumeirah to historical landmarks such as Hatta Cultural Village, Liwa, Al Fahidi Historical Neighbourhood featuring Al Fahidi Fort and Dubai Museum, the authors were given insights into both UAE's rich past and its dynamic present. The writers also visited the Association of Culture and Science, Sultan Bin Ali Al Owais Cultural Centre, Al Bayan newspaper and Emirates Writers Union in Sharjah.

Now, the authors will convert their unique learning experiences into four gripping books. Although the books will be written in the Japanese language, they will also be translated into various other languages, including Arabic and English.

Kika Hotta, one of the writers in the team, said: "I cannot conceal my deep admiration for the remarkable harmony of modernity and tradition in Dubai and the UAE. The diverse mix of nationalities and cultures in

this country is highly impressive."

Another writer, Yumi Fuzuki, said: "What drew my attention during my stay in the UAE is that people living here are highly motivated and inspired by the culture of this place which has become a part of their daily lives."

Kenkichi Tsurukawa, another writer in the team, said: "I'm amazed at the huge respect for individual privacy and the non-interference in others' affairs. Having spent time in the UAE, I have been trying to evaluate the differences between the nature of people's lives here and in Japan."

The visit of the Japanese authors was MBRF's first exchange initiative, launched in partnership with the Japan Arts and Culture Foundation (JACF). Speaking at the launch of the Exchange program, His Excellency Jamal Bin Huwaireb, Managing Director of MBRF, said: "The Writers Exchange program partnership has been conceived with the idea of enabling writers to understand other cultures





and inspire each other. Writers taking part in the program will be able to communicate their experience and understanding to their readers through their own first-hand experiences. By understanding different cultures and inspiring communication between writers, MBRF aims to build knowledge bridges across borders.”

“ I cannot conceal my deep admiration for the remarkable harmony of modernity and tradition in Dubai and the UAE. The diverse mix of nationalities and cultures in this country is highly impressive. ”

—KIKI HOTA

The literary exchange program with Japan won the strong support of Shinzo Abe, Prime Minister of Japan, and the Ministry of Education, Culture, Sports, Science and Technology (MEXT). It was coordinated by Yusaku Imamura, Senior Advisor, JACF and Kayoko Iemura, Director, Japan Arts and Culture Foundation. Both Imamura and Iemura have extensive experience on the international cultural exchange and artist-in-residence program. They have also



“What drew my attention during my stay in the UAE is that people living here are highly motivated and inspired by the culture of this place which has become a part of their daily lives.”

—YUMI FUZUKI

previously worked on the cultural scene in the UAE – Iemura was a curator for the 2014 SIKKA Art Fair and Imamura was advisor for SIKKA and Dubai Art Season in the same year.

“The Writers Exchange Program offers a new horizon of cultural exchange between the UAE and Japan. We are very honoured to work with MBRF on this important exchange program. Japan and the UAE have many exchanges in the field of business, but until now we did not have any significant official cultural exchanges. I hope this program will be a great opportunity to set the pace for more cultural exchanges between the two countries,” said Imamura.

MBRF now plans for the initiative to be extended to several other countries with the aim to contribute to the development of a knowledge-based society. The Writers Exchange Programme is a vital element of the Dubai International Programme for Writing, launched by MBRF under the patronage of Sheikh Ahmed Bin



“By understanding different cultures and inspiring communication between writers, MBRF aims to build knowledge bridges across borders.”

—HE JAMAL BIN HUWAIREB

Mohammed bin Rashid Al Maktoum in October 2013. Under the initiative, four authors each from the UAE and Japan get the opportunity to stay in each other's countries to learn the culture and lifestyle and then enable them to exchange ideas. On completion of the visits, the writers will narrate their experience to their readers through works in Arabic or Japanese.

The Dubai International Program for Writing is aimed at encouraging and empowering young talented writers from around the world who have displayed a flair for writing in various fields such as science, research, literature, fiction and poetry. It is in line with the vision of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to strengthen the process of knowledge transfer and empower young Arab talents to develop their skills in order to enhance the contribution of Arab literature and creativity to the literary world. †



MBRF BRINGS NOBEL TO DUBAI

In another first, the Mohammed Bin Rashid Al Maktoum Foundation (MBRF) is bringing Nobel Museum's travelling exhibition, *The Nobel Prize: Ideas Changing the World* to Dubai. This is the first time the distinguished exhibition is being hosted in the Arab world.

The exhibition will shed light on the elite prize and how the Nobel Prize-winning efforts have shaped the transformation of the world. The museum will encompass five different themes across five pavilions. The first pavilion offers an introduction to the Nobel Prize and its specific areas. The second pavilion called Alfred Nobel gives insight into the life of Alfred Nobel, his inventions and industrial operations, and the background to his will. The third pavilion, *The Nobel Prize Over the Decades*, traces the history of the Nobel Prize and introduces the Nobel laureates and their work. Find out how the Nobel Prize winning efforts affect our daily life in the fourth

pavilion titled *The Nobel Prize in Our Daily Lives*. The fifth pavilion, *The Nobel Prize and the Future*, addresses the question of how Nobel Prize-awarded discoveries may affect the future and what future Nobel Prizes may involve.

Being hosted at the iconic Burj Khalifa the exhibition is expected to be a magnet for thousands of visitors, especially for thinkers, intellectuals and the student community. It will remain open for one month free of charge, starting from 29 March 2015.

H.E. Jamal Bin Huwaireb, Managing Director of MBRF, said: "We are proud to bring Nobel Museum's *The Nobel Prize: Ideas Changing the World* exhibition to Dubai. It comes as an opportunity to highlight the huge contribution of Nobel Prize-winning efforts in shaping our world. The hosting of the exhibition will add much value to MBRF's efforts to spread knowledge in the world. It is in line with our sustained efforts to find innovative solutions in the



dissemination and transfer of knowledge.”

Olov Amelin, Director of Nobel Museum, expressed great delight at being able to present the exhibition in a new concept and theme for the first time in the Arab world. “We are delighted to be in Dubai, which is a centre of knowledge dissemination in the region. We are confident that the hosting of the exhibition by MBRF will help raise awareness about the Nobel Museum and its objectives to spread knowledge as well as to create interest and discussion around the

natural sciences and culture through creative learning.”

The Nobel Prize: Ideas Changing the World exhibition comes to Dubai after visiting New Delhi, Rio de Janeiro, and São Paulo. The exhibition is part of Nobel Museum’s international activities, started by the Nobel Foundation in 2001. More than 5 million visitors have seen the exhibition produced by the museum, which describes the work done by more than 800 Nobel Laureates. [↑](#)





UAE'S GREEN INITIATIVES

*The country is aiming
to become a world
leader in sustainable
development.*



His Highness Sheikh Mohamed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, has been actively driving initiatives to create a truly green and sustainable city within the next three decades. Outlined under UAE Vision 2021 and Dubai Integrated Energy Strategy 2030, these include the rational use of energy and fuel, encouraging conversion of waste to energy and sustainable transport infrastructure.

A variety of initiatives have been introduced which call for the involvement of the public, corporate and even government bodies. Recently Dubai Municipality created a world first by signing a groundbreaking agreement with Neutral Fuels LLC to replace diesel in its vehicles with clean biodiesel. With this agreement, Dubai will become the first city in the world to formally adopt biodiesel made 100 per cent locally from 100 per cent waste cooking oil for use in its municipal vehicles. Neutral Fuels has been producing biodiesel in the UAE since 2010, when it became the first biodiesel manufacturer ever to be licensed in Dubai. By adopting biodiesel, Dubai Municipality has created a sustainability benchmark for the rest of the world to follow.

Earlier Dubai's Supreme Council of Energy (DSCE) announced that the UAE will reduce its energy consumption by 30 per cent by 2030 and reduce its carbon emissions through an increasing focus on renewable resources. DSCE's first State Energy Report 2014, produced in collaboration with the United Nations Development Programme (UNDP), states that gas would be used for 71 per cent of the emirates' total power output, while 12 per cent would come from nuclear energy and clean coal, and five per cent of the total power generation would be through solar energy. The country also plans to reduce its dependency on natural gas by 40 per cent by 2030. DSCE also said that 50 per cent of the energy to be produced at the forthcoming Dubai Expo 2020 would be from renewable sources on site. Notably, the Dubai Expo 2020 will showcase the first large-scale application of building-integrated photovoltaic and solar technology.



NATIONAL INITIATIVES

Back in 2012, His Highness Sheikh Mohamed Bin Rashid Al Maktoum, UAE Vice President and Prime Minister and Ruler of Dubai, announced the launch of a long term national initiative to build a green economy in the UAE under the slogan 'Green Economy for Sustainable Development'. It aims to establish the country as a world leader in green economy and a center for export and re-export of products and green technologies. The strategy also aims to maintain a sustainable environment to support long-term economic growth.

By adopting biodiesel, Dubai Municipality has created a sustainability benchmark for the rest of the world to follow.

DUBAI INTEGRATED ENERGY STRATEGY 2030 ESTABLISHED THE FOLLOWING FUNDAMENTAL ELEMENTS THAT COMPRISE A HOLISTIC APPROACH TO ENERGY CHALLENGES:

1. GOVERNANCE & POLICIES:

- ⇒ Policy Framework
- ⇒ Streamlined Energy Sector

2. ENERGY EFFICIENCY & DEMAND REDUCTION:

- ⇒ Energy Efficiency
- ⇒ Abatement measures for water, power and fuel transportation
- ⇒ CO2 Abatement Strategy

3. ENERGY SECURITY & SUSTAINABLE COST OF GAS:

- ⇒ Solar Power Project
- ⇒ Gas supply Strategy
- ⇒ Clean Coal Plant

4. FINANCIAL MECHANISM & CAPACITY BUILDING:

- ⇒ Financial Mechanism
- ⇒ Energy Fund
- ⇒ National Capacity
- ⇒ Technology & Market Dynamics

THE DUBAI GREENHOUSE GAS INVENTORY

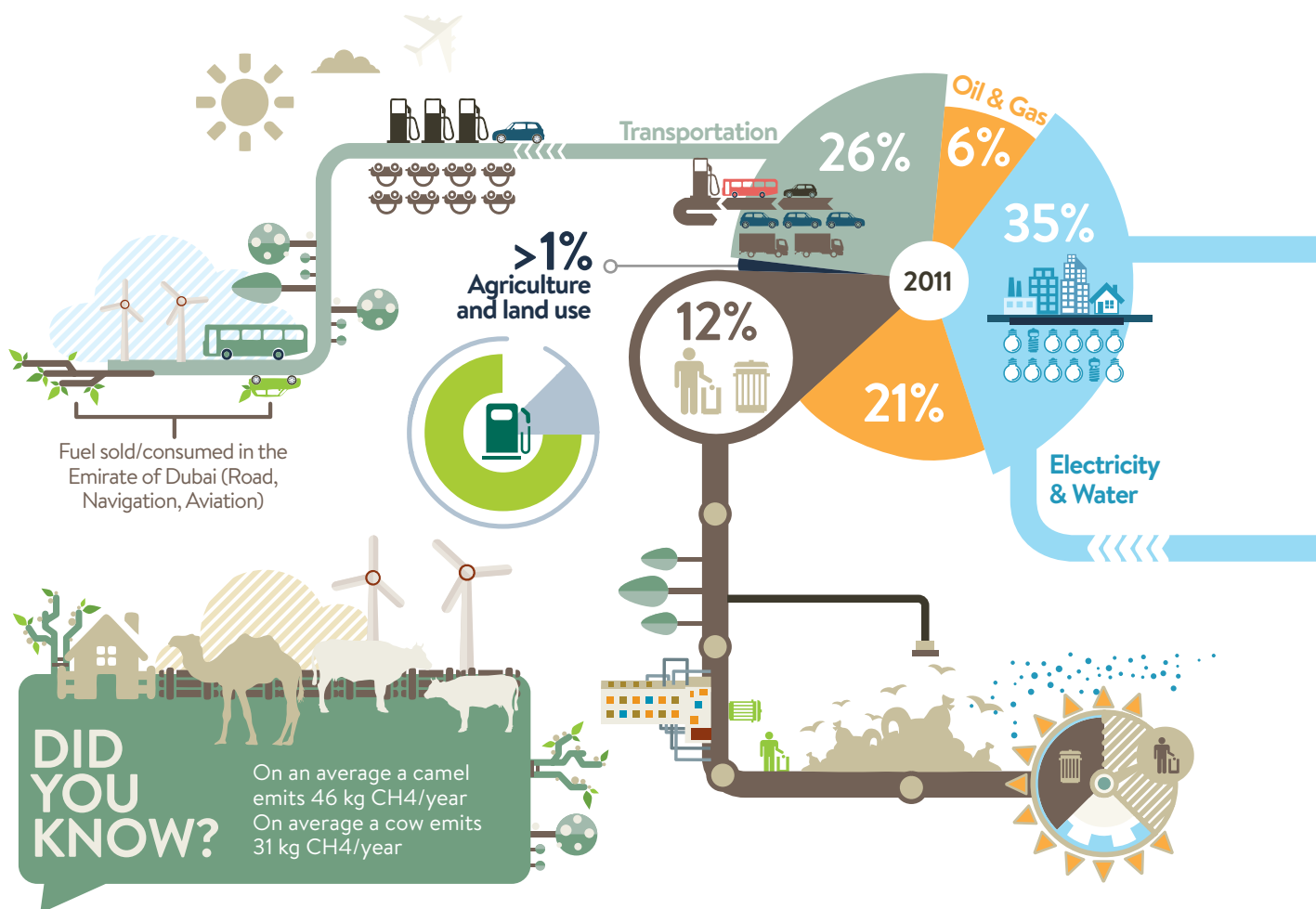
A baseline study mandated by the Dubai Supreme Council of Energy and executed by Dubai Carbon for the Emirate of Dubai 2011.

CO₂ CH₄ N₂O HFCs SF₆ PFCs

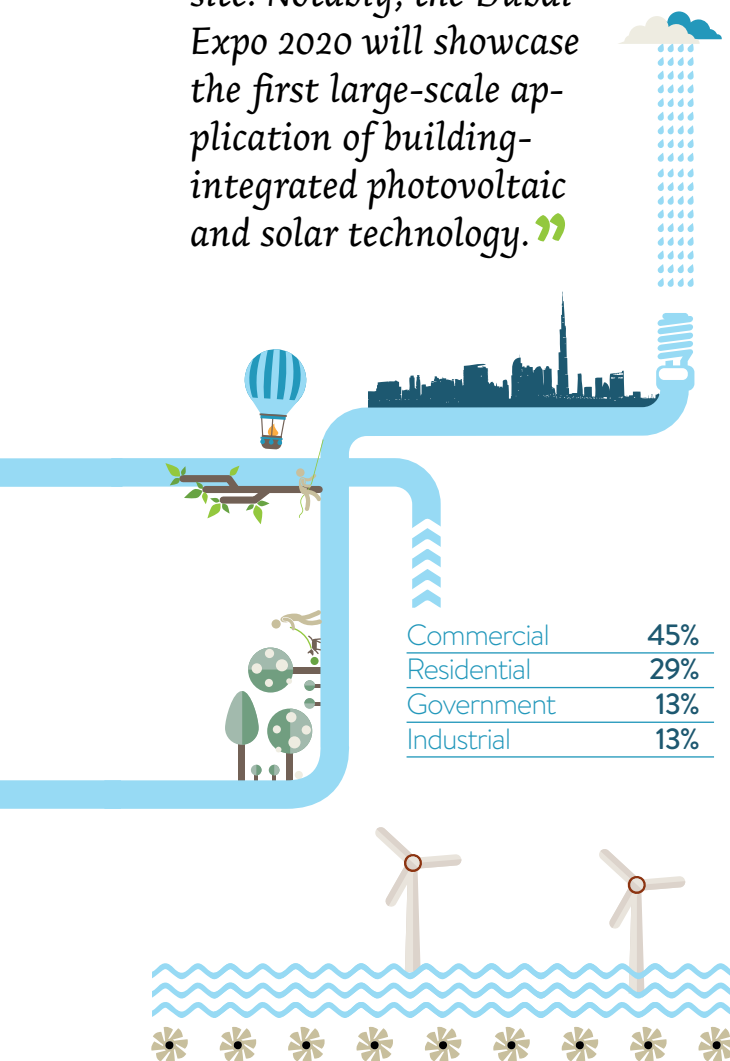
Energy IPPU** AFOLU*** Waste

2006 IPCC* GUIDELINES

Example: Dubai, 2011



“DSCE also said that 50 per cent of the energy to be produced at the forthcoming Dubai Expo 2020 would be from renewable sources on site. Notably, the Dubai Expo 2020 will showcase the first large-scale application of building-integrated photovoltaic and solar technology.”



* Intergovernmental panel on climate change
 ** Industrial Processes & Product Use
 *** Agriculture Forestry & Other Land Use
 Source: State of Energy Report – Dubai 2014

Sheikh Mohammed has often asserted that the UAE, under the leadership of President His Highness Sheikh Khalifa bin Zayed Al Nahyan, seeks to become a global hub and a successful model of the new green economy. As such Dubai's goal is to build the economy that maintains the environment, as well as an environment that supports the growth of the UAE economy. Green Economy for Sustainable Development (GESD) includes a wide range of programmes and policies in the areas of energy, agriculture, investment and sustainable transport in addition to environmental and constructional policies to raise the quality of life in the UAE. Additionally, in line with Vision 2021, the UAE seeks to base its economy on knowledge and innovation, where employment opportunities for citizens can be created, natural and environmental resources can be maintained and the country's competitive position in global markets, especially in the areas of renewable energy, and green economy related products and technologies, will be strengthened.

Some of the highlights of GESD are:

☞ **RENEWABLE ENERGY:**

The production and use of renewable energy and related technologies to promote the use of clean fuel for energy production.

☞ **ENCOURAGE INVESTMENTS:**

To facilitate the import, export and re-export of green products and technologies, as well as to create job opportunities for citizens in these areas and preparation of national cadres in this field.

☞ **BUILD A GREEN CITY:**

A large group of urban planning policies are aimed to raise the efficiency of housing and buildings.

☞ **WARD CLIMATE CHANGE:**

Policies have been designed to reduce carbon emissions to also promote organic agriculture through a series of incentives at the federal and local levels and marine environment in the UAE.

☞ **'GREEN LIFE' – AGAINST WASTAGE:**

A set of policies and programmes aimed at rationalising the use of water resources, electricity, and natural resources as well as projects to recycle waste.

DUBAI GREEN ECONOMY PARTNERSHIP

The brainchild of Sheikh Hamdan Bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai, this programme seeks to spur sustainable and green growth of Dubai's economy and promote its position in the global green economy value chain for green and clean technologies and sustainable consumption. Launched in 2012, Dubai Green Economy Partnership aims to create new commercial opportunities by facilitating smooth adoption of technological solutions that have economic

and ecological proven feasibility. It also calls for the application of best practices in optimum and economic use of resources and conservation of the environment and natural resources.

The programme tops the city's strategic initiatives and achievements in introduction of environmental sustainability standards and deployment of green and clean technologies to reduce carbon footprint and enhance efficiency and competence of use of resources from energy, water, waste management and other applications in public transport and green buildings. The programme



WORLD FUTURE ENERGY SUMMIT

In January this year, the UAE hosted the World Future Energy Summit (WFES); the world's foremost event dedicated to renewable energies, energy efficiency and clean technologies. This year, its eight edition, was attended by over 30,000 delegates from 170 countries, representing expertise from industry, technology, finance and government.

Hosted by Masdar, Abu Dhabi's renewable energy company, the WFES Conference attracts world leaders, international policy makers, industry experts, investors from the public and private sector and media, who gather in Abu Dhabi to discuss practical and sustainable solutions to future energy challenges. The 2015 conference programme featured

in-depth panel discussions headlined by international leaders such as HE Abdelkader Amara, Moroccan Minister of Energy, Mines, Water and Environment; Maria van der Hoeven, Executive Director of the International Energy Agency (IEA); and Sean Stafford Kidney, CEO of the Climate Bonds Initiative, among many others.

The Summit is the anchoring event of the Masdar-hosted Abu Dhabi Sustainability Week which includes a variety of initiatives such as the International Water Summit (IWS), EcoWASTE, and the Zayed Future Energy Prize. The week also coincides with the Fifth General Assembly of the International Renewable Energy Agency (IRENA).



Dubai Green Economy Partnership aims to create new commercial opportunities through facilitating smooth adoption of technological solutions that have economic and ecological proven feasibility.

will boost public-private sector strategic partnership to generate new opportunities for transfer of knowledge and best practices and funding green projects which serve as living demonstration for future cities.

It is expected that the Partnership will further strengthen Dubai's position as a hub of sustainable businesses and the perfect test bed for emerging green technologies. The programme also aims to strengthen sustainability guidelines that can reduce carbon emissions, increase energy efficiency and encourage water conservation.

WORLD GREEN ECONOMY SUMMIT

Another key milestone in Dubai's growth towards becoming a global green economy, the World Green Economy Summit, is held under the patronage of HH Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, and hosted by Dubai Electricity and Water Authority (DEWA) in association with World Climate Ltd. The Summit is the MENA region's first event based on improving the profitability of sustainability practices, products and services. The Summit is considered an extremely important step towards driving the UAE's development into a green economy, through investment, green partnerships and the creation of a global market for green products, technologies and services. The Summit falls in line with Sheikh Mohammed's Green Economy for Sustainable Development and the Dubai Green Economy Partnership as well as the UAE's Vision 2021.

Each year, the WGES sees the unveiling of some important initiatives, strategies and projects in the field of green economy and brings together top decision makers in the

field of green economy and sustainability, including governments, non-government organisations and key thinkers from the business sector. The summit therefore provides an important platform to look at the business opportunity around the green economy, and discuss ways a framework of action can be created.

It is evident then that the UAE is rapidly playing a pivotal role in the encouragement and incubation of ideas for those who are seeking green, sustainable development. As such Dubai is setting a regional and global example for sustainable economic growth and tangible reductions in carbon emissions. ↑

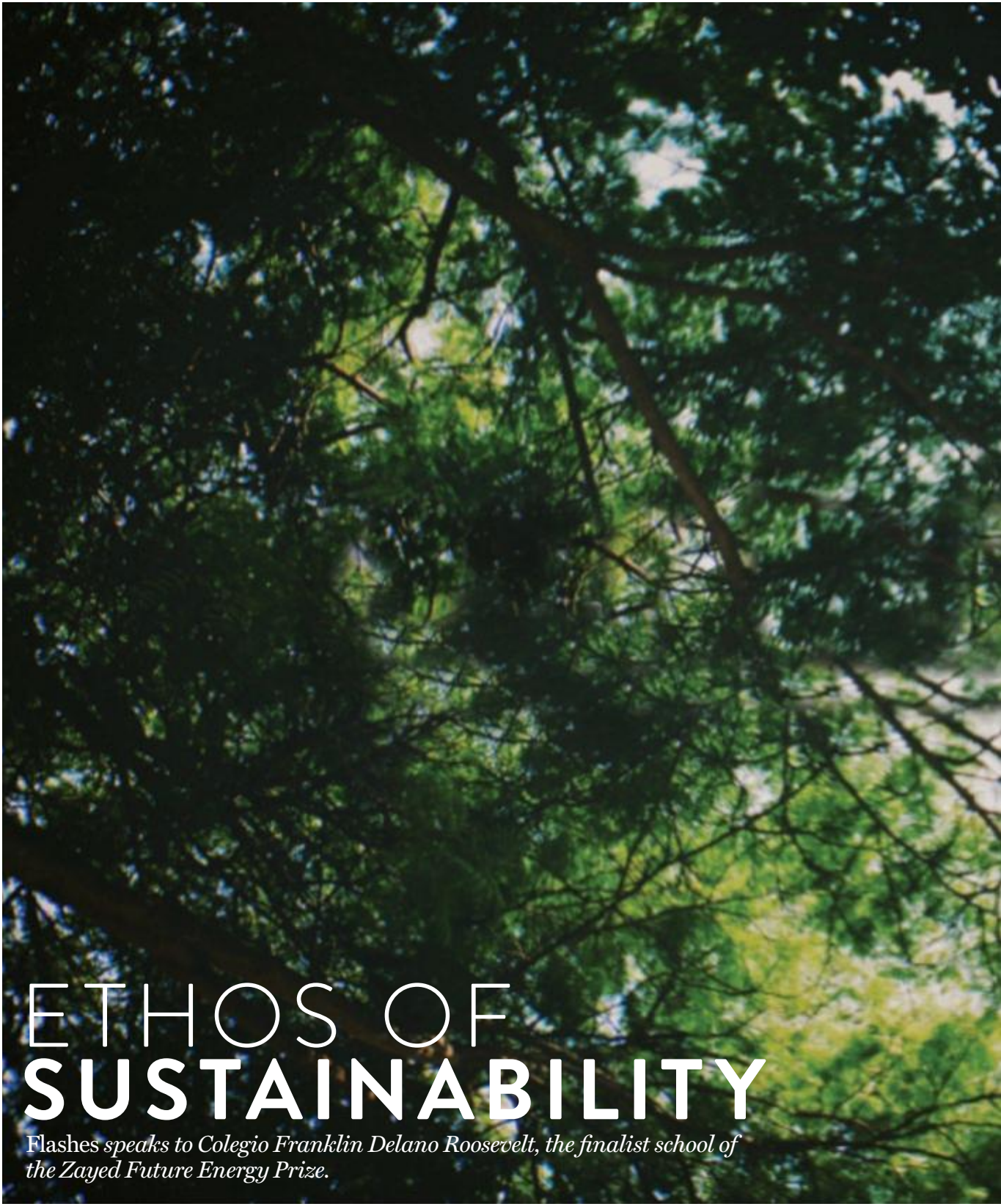


SUN BOUND

The Mohammed Bin Rashid Al Maktoum Solar Park was established in 2012 by The Supreme Council of Energy (SCE) for Dubai as part of Dubai's 2030 energy diversification goals aimed at bringing clean energy's contribution to the emirate's total power generation to 12 per cent. The Park is the first of its kind in the region and is managed and operated by Dubai Electricity and Water Authority (DEWA). Its first phase of 13 MW was brought online in 2013. In January this year, DEWA announced that the production capacity of the second phase of the Mohammad bin Rashid Al Maktoum SolarPark will be increased from 100MW to 200MW. The second phase is a photovoltaic plant that will be based on the Independent Power Producer (IPP) model and will be operational by April 2017. With a planned total cost of Dh12 billion, the Solar Park will produce 1,000 MW of electricity when completed in 2030.



**THE PROGRAMME
INTRODUCES
ENVIRONMENTAL
SUSTAINABILITY
STANDARDS AND
DEPLOYMENT
OF GREEN
AND CLEAN
TECHNOLOGIES
TO REDUCE
CARBON
FINGERPRINT.**



ETHOS OF SUSTAINABILITY

Flashes speaks to Colegio Franklin Delano Roosevelt, the finalist school of the Zayed Future Energy Prize.



Each year the Zayed Future Energy Prize, under the Global High School Prize category, recognises schools that instill an ethos of sustainability amongst student's right from an early age and awards them generous grant to further their initiatives. Grant money amounting up to \$100,000 is allocated to one school in each of five regions: The Americas, Europe, Africa, Oceania, and Asia.

For 2014, Colegio Franklin Delano Roosevelt in Lima, Peru was named one of the five finalists for the Prize. The school's grant winning proposal includes the implementation of solar-water heaters, solar panels and the on-site production of bio-fuels for their school bus.

Here Allana Rumble, Coordinator of the Global Citizenship Program at Colegio Roosevelt, talks to *Flashes* about their exemplary initiatives.

Congratulations on being selected as a finalist for the Zayed Future Energy Prize (ZFEP). What has your experience been during the selection process?

Colegio Roosevelt was a 2014 finalist for the ZFEP Global High Schools category. This was an amazing learning curve for the whole team involved. Throughout the finalist process, including the educational travel across UAE and attending the ZFEP Grand Award Ceremony and Abu Dhabi Sustainability Week, our knowledge of the ZFEP has grown considerably along with our vision for a sustainable future.

Tell us about your GEAR Box, Generating Energy Alternatives Research Box, proposal?

Peru is underdeveloped in its alternative energy manufacturing capabilities. As a school we often encountered obstacles in finding competitive and reliable local providers for solar thermal, solar photo-voltaic and diesel to gasoline engine converters. In order to solve this issue, we proposed the concept





Clockwise from top:
The innovative batch
of students; Colegio
Roosevelt was a
2014 finalist for the
ZFEP Global High
Schools category;
Green team; the
solar thermal
heating system used
for the school pool.



of the GEAR Box. The Generating Energy Alternatives Research Building/Box will be a purpose built facility on the Colegio Roosevelt Campus for research and development of energy alternatives for students at the Primary and Secondary School level. The building itself will be a simply structured industrial-style facility with the capacity to research, design, and experiment with energy solutions relating to energy production, conservation, efficiency, and transport. Student-led, project-based learning will bring the building alive, with collaboration from a local engineering university, UTEC, commercial alternative energy providers such as Enertek, non-government organisations (NGOs) such as Wind Aid, and of course Colegio Roosevelt's teachers. Completion of the project is expected to take about eight months, from laying the base foundation to equipping the GEAR Box with the latest technological facility.

Colegio Roosevelt has integrated many green solutions into its campus. Can you tell us about some of them?

Responsible integration of consideration for the environment into decision making has helped to make our school a leader in environmental sustainability in education in South America.

2kWh wind turbine installed on the roof of Media Centre



Throughout our campus, community and curriculum there is evidence of our commitment to create responsible solutions to environmental issues. Highlights include:

- ⇒ A 2 kWh wind turbine, 9 m in height, was installed on the roof of our Media Center in 2010 to act as a beacon for alternative energy within our community. The energy produced from the wind turbine is used to recharge laptops and audio visual equipment within the Media Center.
- ⇒ The school has a community garden and greenhouse used for educational and service related projects.
- ⇒ A solar thermal heating system is used for the school pool which reduces carbon emissions and is more economic as well. Savings generated from the solar thermal project are placed in a green revolving fund for future sustainability initiatives.
- ⇒ A "Green Team" consisting of students, staff, parents, leadership team, administration and support staff meets once every two weeks to collaboratively maintain and build upon ongoing sustainability initiatives.
- ⇒ The school has rich coverage of environmental and social education built into its curriculum as an IB World School ensuring that community members gain understanding of environmental issues to guide their practical, systemic, solution development.

Tell us about the Clima Conference and Youth EDx Summit the school

organised recently. How do these contribute to building a sustainable environment?

From 21-23 November 2014, Colegio Roosevelt hosted the Clima Student Leadership Climate conference. This was just one week ahead of the UN Climate Talks/COP 20 being hosted in Lima, Peru. Our conference was a student-led, student-directed event which brought together a dozen different schools with dozens of nationalities of students in a united voice to share the solutions students had developed to tackle climate related issues through the Global Issues Network Program, to debate and ratify the issues surrounding climate change through the Model United Nations and to spread awareness and ideas through an Edx Summit of exceptional youth speakers.

Climate Change is a global issue and the current format of the UN Climate Talks does not allow for participants under the age of 18. The Clima conference allowed our student leaders to actively engage in the solution development surrounding these essential issues. This was empowering for all involved.

Events such as these contribute to developing a sustainable environment by placing students at the center of the conversation and purposely developing and sharing their leadership in this area.

Why do you think it is important for schools to be involved in environment sustainability?

It is important for schools to be involved in sustainability because a school is a community with a primary purpose of preparing young people for the future. If we are meeting this challenge then surely we should be providing students with the skills and knowledge for long-term planning for that future. Education for environmental sustainability is developed in students by making it engaging, exciting, practical, meaningful and as hands-on as possible. 21st Century students at Colegio Roosevelt are prepared to meet this challenge. Colegio Roosevelt works actively to engage the greater community, including universities, NGOs and government agencies, in our numerous environmental initiatives, integrating this ideology into our school culture. ♡



**THE GEAR BOX
WILL BE A
PURPOSE BUILT
FACILITY FOR
RESEARCH AND
DEVELOPMENT
OF ENERGY
ALTERNATIVES
FOR STUDENTS**

Melting glaciers have big carbon impact

New study reveals that rise in sea-levels isn't the only effect of melting glaciers.

Glaciers and ice sheets contain about 70 per cent of Earth's freshwater. As Earth warms, scientists have always focused only on how glaciers melting will affect sea level rise. But glaciers also store organic carbon derived from both primary production on the glaciers and deposition of materials such as soot or other fossil fuel combustion byproducts. So what will happen to this carbon when the glaciers melt?

This is the focus of a new study published recently in *Nature Geoscience*. It is interesting to note that the study is the first of its kind by scientists to estimate what will happen to the organic carbon stored in ice sheets when they break down.

The research team studied measurements from ice sheets in mountain glaciers globally, the Greenland ice sheet and the Antarctic ice sheet to measure the total amount of organic carbon stored in the global ice reservoir – the amount is a significant one.

Worldwide, glaciers and ice sheets contain about six billion tonnes of organic carbon. But most of it is locked up in the vast Antarctic ice sheet. As the ice melts or large chunks break off, known as calving, the carbon gets released, the paper explains. Around three million tonnes of organic carbon are released from glaciers

and ice sheets each year, researchers say, with around 13 per cent caused by melting from rising global temperatures. The amount of organic carbon exported in glacier outflow will increase 50 per cent over the next 35 years.

IMPACT

"This research makes it clear that glaciers represent a substantial reservoir of organic carbon," said Eran Hood, the lead author on the paper and a scientist with the University of Alaska Southeast. The loss of glacier mass worldwide, along with the corresponding release of carbon, will affect high-latitude marine ecosystems, particularly those surrounding the major ice sheets that now receive fairly low land-to-ocean flows of organic carbon.

Organic carbon provides food for tiny organisms at the bottom of the food web. So the extra carbon flowing into rivers and oceans may affect the plants and animals that live around the ice sheets, the researchers say. Adding organic carbon can also affect the chemistry of water, by making it more acidic, for example.



WORLDWIDE,
GLACIERS AND
ICE SHEETS
CONTAIN ABOUT
SIX BILLION
TONNES OF
ORGANIC
CARBON

A RESEARCH FIRST

The research is the first to estimate the total amount of organic carbon held in ice across the world. Researchers collected measurements of organic carbon concentrations from more than 300 samples of glacier and ice sheets in four continents.

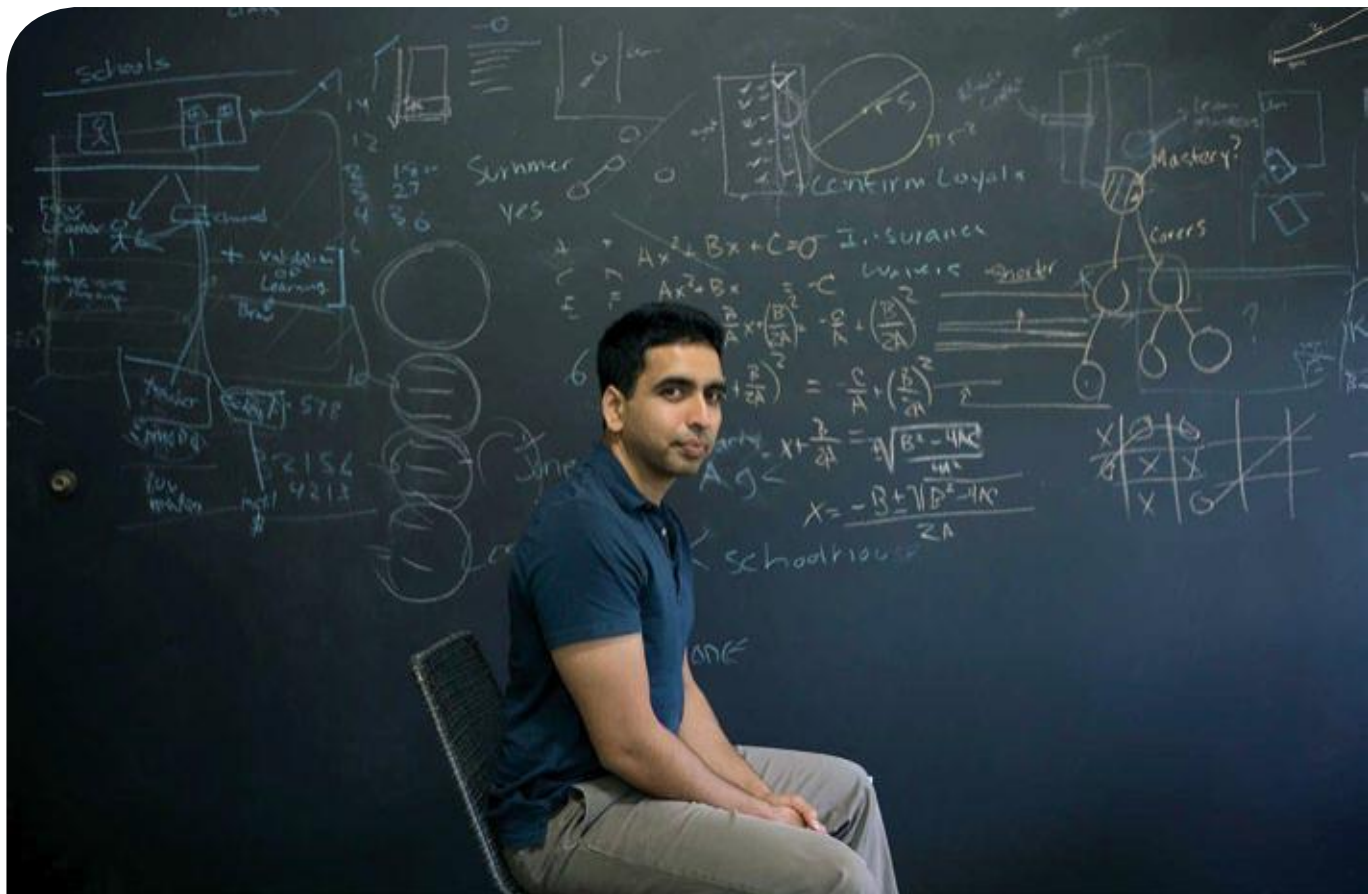
The team is continuing on this line of research and will do additional studies to try to determine exactly what the impact will be when that carbon is released into existing bodies of water. 



2014 WAS THE HOTTEST YEAR ON RECORD

The year 2014 was the hottest on record, part of a “warming trend” that appeared set to continue, the UN’s weather agency said last month. Average global air temperatures in 2014 were 0.57 degrees Celsius (1.03 degree Fahrenheit) higher than the long-term average of 14 C (57.2 F) for a 1961-1990 reference period, reported the World Meteorological Organization (WMO). Global sea-surface temperatures also reached record levels.

Scientists warn that a 4°C warmer Earth would be hit by more catastrophic droughts, floods, rising seas and storms, with wars likely fought over ever-scarcer resources like water. According to the UN’s Intergovernmental Panel on Climate Change, emissions must be slashed by 40-70 per cent by 2050 from 2010 levels and to near zero or below by 2100 for a good chance of reaching two-degree warming.



How Khan Academy is reinventing education

Sal Khan, founder of Khan Academy, is giving learning a facelift through online video tutorials.

With nearly 15 million students learning, Khan Academy (KA) is perhaps the world's largest school – the twist being that it teaches through a series of carefully crafted video lessons, tutorials and interactive exercises. To date, they have delivered over 400 million lessons and learners have completed over 3 billion exercise problems (which is around 4 million per day!). In addition they have 500,000 registered teachers around the world who use KA in their classrooms to help to inspire, motivate and guide students through their learning paths.

So what sets Khan Academy apart? The factors are many: they have approximately 3400 videos covering a massive number of topics, ranging from math, medicine

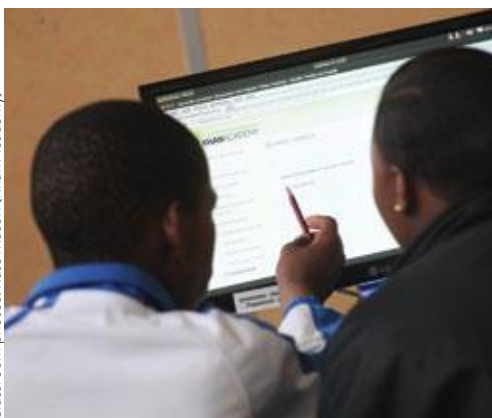
and physics to art history and economics. Their video lessons have been translated into 28 languages, and most importantly, all the learning material is absolutely free of charge. All learners need is a computer and a will to learn to start their educational journey. The videos last between seven to fourteen minutes and students can view them as many times as they like.

THE BEGINNING

The revolutionary Khan Academy is the brainchild of educator Salman (Sal) Khan. The most-used educational video repository on the Internet began in 2004 when Khan began posting math tutorials on YouTube for his cousins. The videos were an



BY 2011, ITS VIDEOS HAD BEEN VIEWED MORE THAN 200 MILLION TIMES, THE SITE WAS USED BY SIX MILLION UNIQUE STUDENTS EACH MONTH



Clockwise from top: Peru-Innova School; Kuna Middle School (Grade 7) Idaho; KA in Indonesia Orphanage; Eastside Prep (Grade 6); South Africa - Makhaza



instant hit, not only with Khan's cousins but also with complete strangers who stumbled upon them by chance. After a deluge of positive comments, Khan officially launched Khan Academy in 2008. The Academy's mission statement is to serve as a not-for-profit organization with the mission of providing a free, high-quality education to anyone, anywhere.

By 2011, its videos had been viewed more than 200 million times, the site was used by 6 million unique students each month who collectively solved more than 750 million problems (about 2 million a day), and the material, which is provided at no cost, is (formally or informally) part of the curriculum in 20,000 classrooms around the world. Sixty per cent of KA students are from the United States, the rest hail from countries like India, Brazil, Mexico, South Africa and beyond.

Yuri Milner, the Russian physicist turned venture capitalist who was an early investor in Facebook, Twitter and Groupon, called Sal Khan the world's superstar teacher. Today Khan Academy is supported by a bevy of high-profile social stalwarts like the Melinda and Bill Gates Foundation, Ann and John Doer, Dan Benton and Valhalla Charitable Foundation.

START OF A REVOLUTION

Khan Academy's incredible success as an educator prompted many schools to adopt its instructional videos to teach and help students. KA's educational products were initially piloted and implemented in the Los Altos School District in San Francisco. In 2011, Los Altos rolled out Khan Academy district-wide in all 5th, 6th, and some 7th and 8th grade classrooms. The school's teachers use KA's mobile labs to supplement their curriculum and work

on math concepts they find challenging. The Khan Academy data helps teachers to create more time in their schedules for hands-on, creative projects. After Los Altos' success, Khan Academy has been implemented in nearly a dozen more schools.

At the beginning of this year, KA introduced the next step in its mobile learning story by bringing interactive, personalised learning to the iPad. Now, for the first time the entire library of Khan Academy has been made available on iPads. The app gives students access to over 150,000 interactive, common core aligned exercises with instant feedback and step-by-step hints for each question. The app also auto-syncs between the learner's iPad and KA's website so their progress is always tracked.

Sal Khan is now working on a universal credentialing system that is comparable to a Stanford or Harvard degree. Learners are hoping he does it soon. [f](#)



Technology on a vanishing act

Wearable technology is becoming invisible.

Wearable technology is getting a makeover. It will now be harder to spot people wearing smart watches, tracking bracelets or health monitors. Users are now demanding that wearable technology integrate into their life without the hassle of being a device. This change in preference was visible in full swing at the Consumer Electronics Show 2015 (CES2015) held in Las Vegas in early January where invisible wearable technology grabbed the limelight.

Manufacturers selling products that do not flag the fact that the wearer is sporting a gadget flooded the show floor. AmpStrip is a case in point. The heart rate and activity tracker is designed like a plaster that has to be stuck to the wearer's torso. It can be left there for seven days at a time, hidden from view. "Once you're done and want to remove it, you can peel it off like a Band-Aid, recharge it, put another adhesive on it and put it back on," explained Dave Monahan, chief executive of its maker FitLinxx. Monahan believes that the wearables war can only be successful if the product is invisible and kind of fades into the user's life. He cites the example of an athlete trying to train for an event, who wants his health information round the clock but



Top & above: Lechal Haptic inner soles link up to a smartphone via Bluetooth.

doesn't want the technology to obstruct his movements. Similarly Ducere Technologies' Lechal Haptic inner soles link up to a smartphone via Bluetooth and vibrate under the wearer's feet to provide notifications. These include fitness-related alerts – triggered, for example, when an internet-paired rival runs faster – or directions, by buzzing the relevant foot.

SMART CLOTHES AND JEWELLERY

This change in trend is not limited to devices only. Clothing is undergoing a similar revolution too. UK's Cambridge Consultants and France's Cityzen Sciences have launched prototype smart shirts which have a range of sensors integrated into the fabric.

Australian company Sports Performance Tracking recently put on sale GameTraka, a GPS-enabled device that sits behind the wearer's neck to provide performance data from contact sports such as rugby and basketball.

"Just because you want data, doesn't mean you want the device gathering it to be seen," said William

AmpStrip is designed like a plaster that has to be stuck to the wearer's torso to track activity and heart rate.



Strange, manufacturer of GameTraka. "I'm not a fan of wearing wearables – the only thing I want you to see is my watch and not lots of gadgets all over me, and I think many people are the same," he added.

Activity-tracker maker Misfit recently unveiled a solar-charged tracking model that hides its technological origins behind a large purple Swarovski crystal, turning the device into a piece of jewellery.

"Our thinking is can we make something that is both beautiful and functional that people will want to wear," says Lindsay Kresch, Misfit's director of corporate partnerships.

Fitbit too is experimenting with fashion by partnering with designer Tory Burch, who has created a range of gold and silver bracelets and pendants that conceal the device's tracker component. Such fashion tie-ups are also helping technology companies remain distinctive, protecting them from budget-priced rivals who are often quick to incorporate similar sensors and functionality.

DAWN OF THE SMART WATCH

Experts believe that the key tussle between visible and concealed wearable technology may occur in the smart watch sector. Apple will soon join Samsung, LG, Motorola and

others in releasing a device that runs apps on a small touchscreen.

Martian – a smart watch pioneer, whose kit accepts voice commands and displays notifications on a small readout – has opted for a look dominated by analogue watch hands. It has just unveiled new models designed and branded by fashion firm Guess.

Similarly, watch-giant Fossil has announced intention to launch a wide range of technology-enhanced wearables after forming a partnership with Intel. The first models are expected to go on sale later this year. Some will be touchscreen smart watches powered by Android Wear, but others will be more traditional looking watches and other forms of jewellery that have their sensors and computing functions hidden away. Swiss firm Tag Heuer is also reported to be preparing a range of traditional-looking smart watches.

While we are seeing the start of a new trend, industry experts think that it would be premature to predict the end of visible wearables. However they do forecast that the wearable technology market could generate as much as \$70bn of sales a year within a decade. That is reason enough for manufacturers to pick the right look. 



Martian unveiled new models designed and branded by fashion firm Guess.

Misfit's solar-charged tracking model hides its technological origins behind a Swarovski crystal.



Fitbit partnered with Tory Burch, who created a range of gold and silver bracelets and pendants that conceal the device's tracker component.



In a radically new idea, billionaire entrepreneur and philanthropist Bill Gates is promoting a machine that converts human faeces into potable water. While most of us may cringe at the idea, the manufacturer of the machine and Bill Gates claim that this might help solve the world's water crisis.

The Omniprocessor, one of the latest projects to be funded by the Bill and Melinda Gates Foundation, is a steam-powered sewage processor that burns up solid waste and creates both potable water and electricity. The machine was designed and built by the Washington-based engineering firm Janicki Bioenergy. Gates believes the machine can help solve one of the developing world's biggest problems — access to clean water.

In his blog, Gates says that at least two billion people the world over relieve themselves in bathroom facilities that are not properly drained. He also noted that many others do not even have access to bathrooms at all and defecate in the open. All of this improperly processed waste contaminates the drinking water of millions of people in communities around the globe resulting in disease that kills about 700,000 children every year, and stunts the physical and mental development of many more.

The solution to this devastating problem isn't to build more toilets, argues Gates.

Water from waste

Bill Gates gives thumbs up to water derived from human waste.

Western-style sewer lines and sewage treatment plants are not feasible options in most poor countries. But, a sewage treatment machine like the Omniprocessor may work in such places, he said.

HOW IT WORKS

Measuring about 75 feet (23m) long and 26 feet (8m) across, this small processing plant can handle about 14 tons of waste every day. It can continually process sewage from a community of about 100,000 people, according to the Gates Foundation.

The machine is loaded up with sewer sludge, which travels up a conveyor belt and is fed into large tubes known as dryers. The dryers boil the sludge, removing all the liquid and capturing it as water vapour, which is then heavily processed, making it suitable to drink.

The solid waste is then dumped into an incinerator, which burns up the rest of the waste, creating a good deal of heat. This heat is funneled through a steam engine, which

Below: Bill Gates drinking water from the Omniprocessor.
Right: Omniprocessor

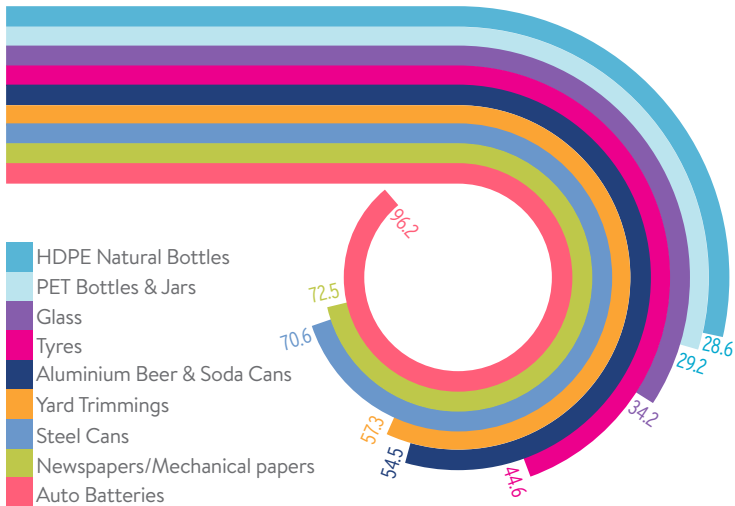


produces high-temperature steam that fuels a generator. The generator creates electricity that is used to power the machine. There is even a little extra electricity left over that can be transferred into the power grid.

This self-sustaining machine will soon be launched in a pilot project in Dakar, Senegal, where Janicki engineers will study the Omniprocessor's operation in a real-world setting. In addition to testing out different locations for the machine and communicating with local community members about how it works, the Janicki team's trial run in Senegal will also test out a system of sensors and webcams that will let engineers in the United States control the machine remotely.

"It might be many years before the processor is being used widely," Gates wrote in his blog post. "But I was really impressed with Janicki's engineering. And I'm excited about the business model. The processor wouldn't just keep human waste out of the drinking water; it would turn waste into a commodity with real value in the marketplace. It's the ultimate example of that old expression: one man's trash is another man's treasure." 

RECYCLING RATES OF SELECTED PRODUCTS (2011)*



* Does not include combustion with recovery

* Polyethylene Terephthalate (PET, PETE or polyester) is commonly used for carbonated beverages, water bottles, etc

* High-density Polyethylene (HDPE) is the most widely used resin for plastic bottles.

MUNICIPAL SOLID-WASTE RATES: WORLD (BILLION TONS)

2.0
2006

2.4
CURRENT EST.

MAX. RATE: 5.9
2025



MANAGEMENT OF MUNICIPAL SOLID WASTE: (2011)

DISCARDED
53.6%

RECOVERY
34.7%

COMBUSTION WITH ENERGY RECOVERY
11.7%

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SINAI'S SAVIOUR

Maged El Said shows what can be accomplished through sound organic farming practices in the desert.

Organic farms are rare to come by in the desert. However, Egypt's Sinai Peninsula, surrounded by stretches of lifeless desert, is now dotted by world-class organic farms. Their healthy produce of vegetables and herbs caters to the demands of tourists and locals in the Red Sea towns of Taba, Nuweiba, Dahab and Sharm El-Sheikh.

South Sinai's organic farms have evolved into a bigger idea: a self-sustaining society. One of the organisations leading this change is the Habiba Organisation founded by Maged El Said with a view to developing new economic models for environmentally conscious agriculture. The organisation also acts as a community-based effort for the benefit of the people of South Sinai. In a short span of time, Habiba has become a beacon for what can be accomplished through sound organic farming practices in the desert.

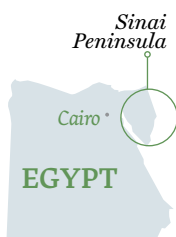
THE BEGINNING

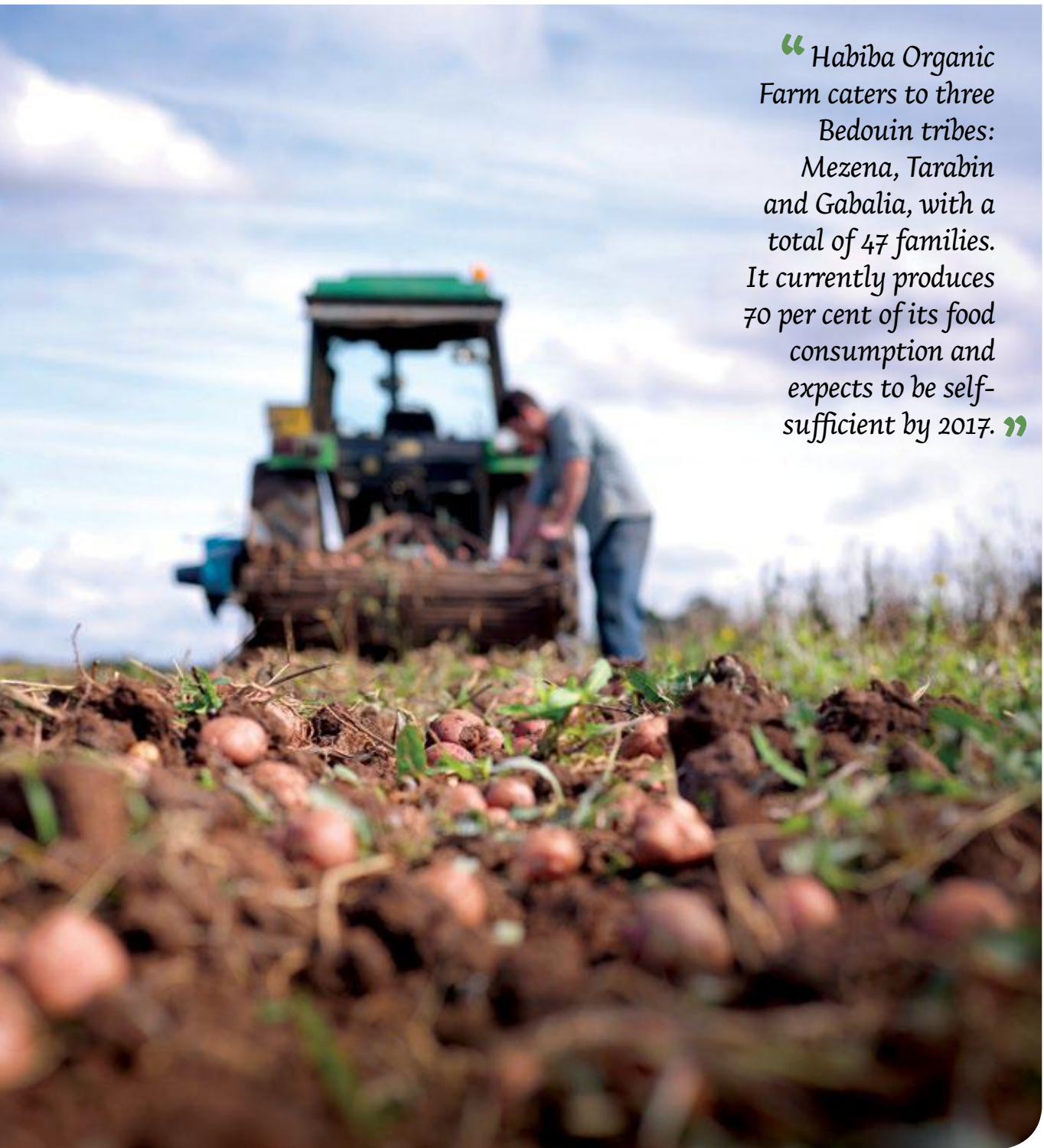
Maged El Said has lived in South Sinai since 1989. Championing sustainable living and the extension of agriculture in the desert, he set up Habiba Organic Farm (HOF) in 2007. Since then HOF has expanded to include an eco-lodge, Sinai Palm Foundation and a Learning and Development Centre.

To ensure sustainability, Habiba's founding principle was to involve the local Bedouin community in all its development. As such, Habiba Organic Farm caters to three Bedouin tribes: Mezena, Tarabin and Gabalia, with a total of 47 families. It currently produces 70 per cent of its food consumption and expects to be self-sufficient by 2017.

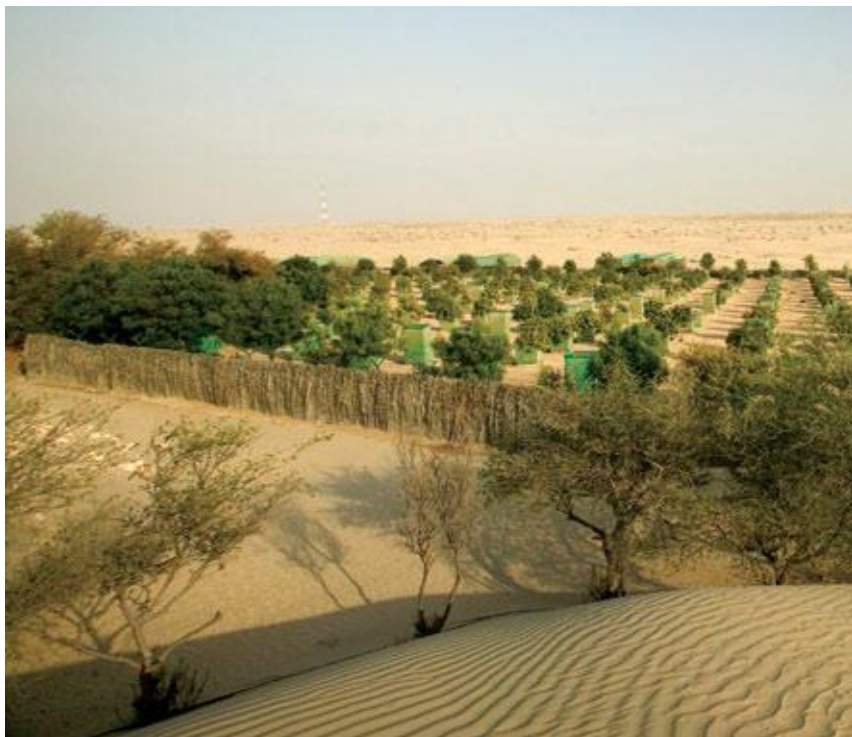
Habiba Organic Farm is listed among World Wide Opportunities on Organic Farms (WWOOF) Independents in the world of sustainable volunteer tourism, the first one in Egypt. HOF is also Demeter registered farm and a member of the Centre of Organic Agriculture (COAE) in Egypt.

Habiba aspires to be a field for experimental and pioneer agriculture projects. In cooperation with the Desert Research Centre for Egypt, it provides students and researchers a friendly environment for studying the desert's flora and fauna. ➤





“Habiba Organic Farm caters to three Bedouin tribes: Mezena, Tarabin and Gabalia, with a total of 47 families. It currently produces 70 per cent of its food consumption and expects to be self-sufficient by 2017.”



➤ HABIBA BEACH LODGE

Habiba's eco-lodge enjoys an all year long occupancy rate averaging 45 per cent, which is considered outstanding especially after the 2011 revolution. Tourists pay a small accommodation fee at the lodge and get to participate in agrarian work on the farm. The 10-room lodge is built completely out of local wood, stones and bricks. It also has a waste separation scheme in collaboration with a local NGO. In addition to its environmental efforts, Habiba lodge is very keen on hiring 100 per cent of its staff from the native community.

The lodge makes available a diverse range of activities to suit all of its clients. There is farming, compost making and planting for agriculture

professionals as well as amateurs curious about organic practices. It also organises awareness sessions delivered by organic agriculture experts.

THE LEARNING AND DEVELOPMENT CENTRE

El Said's after-school centre offers the community's children classes in arts, ethics, social responsibility as well as mainstream subjects such as Arabic, math and geography. This ensures sustainability is part of their education. In addition, the centre trains local women on making pickles, jam and provides them with best practices of goat tending. Habiba Organic Farm also empowers local farmers by teaching them how to build en-suite rooms, which they then 'own'. The

Above:
Maged El Said
Right: Organic
chicken raised.



money paid by tourists staying in these rooms goes to those that built it. In the future, HOF plans to train youth and women on making furniture out of palm tree products.

SINAI PALM FOUNDATION

Recently, El Said launched the Sinai Palm Foundation to expand organic date palm agriculture in Nuweiba. His objective is to plant 1000 palm trees and allow the natives to invest in them as a form of crop-sharing project. By encouraging the local population to invest in a share (a palm date tree), Habiba will organise and coordinate the planting and care of an organic, fruit-producing tree that can provide a steady stream of income for the community years into the future.

Through the project's unique focus on micro-finance, the Palm Date Foundation has the potential to connect a wide range of people from varying cultures in the pursuit of organic and sustainable agriculture in the developing world. The organisation's partners from around the world will have the ability to purchase a tree, sharing part of the profit in future years with the local community while encouraging cultural enrichment and the collaboration of ideas in the process.



Maged El Said, named as a social innovator for Egypt by The Synergos Arab World Social Innovators (AWSI) program, envisions Habiba as a dynamic model, continually experimenting with new crops, farming techniques, and economic initiatives to best suit those living in the Sinai. By cooperating with the local community and experts from various fields, he seeks to realise a shared vision of environmental awareness, economic independence, and sustainable development. El Said hopes to replicate their experience throughout Egypt to demonstrate that doing well and doing good are not mutually exclusive. ♡

Clockwise from left: Habiba Organic Farm; Tourists on the farm; Habiba Eco Lodge; Organic date palm agriculture in Nuweiba.



SAID'S OBJECTIVE IS TO PLANT 1000 PALM TREES AND ALLOW THE NATIVES TO INVEST IN THEM AS A FORM OF CROP-SHARING PROJECT.



EMPOWERING WOMEN

THE RIGHT AND
SMART THING TO DO

Never before has the issue of gender equality and women's empowerment garnered the attention that it does today. On television, radio and the Internet, in newspapers, books and magazines, around meals and in political speeches, people are talking about the role of women, whether at home, in the workforce, or in the political arena. There is much discussion around the question: Can women have it all? While there are differing opinions to this, there is agreement that times are changing. And this change is driven by committed leaders and activists, social media, and an increasing number of studies that point to one inescapable conclusion: Countries and companies perform better when they promote equal opportunity and women's full participation.

There is mounting evidence from the World Bank, the United Nations, the Organisation for Economic Cooperation and Development (OECD), and the private sector showing that gender equality and women's participation contribute to increased growth, productivity and good governance. When men and women enjoy equal opportunities and shared responsibilities, societies can draw on a complete range of talent and skills, and innovation and problem-solving flourish when there is diversity in decision-making.

While every human being has the right to take part in the government of his or her country, directly or through freely chosen representatives, too many women are denied the

right of equal access to public service, and this is limiting the potential of democracy. Studies show that when there are more women in legislatures and city councils, they voice the needs of the poor, the vulnerable, children and families and reshape the discussions and agenda. A study of 19 OECD countries from 1970 to 1990 found that women's representation in parliament was significantly correlated with the strengthening of childcare and parental leave policies.

During these times of economic crises, social upheaval and political transformation, we need to tap into the wisdom and knowledge of both men and women. It is widely acknowledged that women need a critical mass of representation to make a real difference in decision-making. This critical mass of 30 per cent of women in parliament has been achieved by 33 countries and the vast majority of these countries used special temporary measures to reach or exceed this target.

Expanding women's political participation and leadership requires not only temporary special measures, such as quotas, but also strong public support for women in politics. Today women face gender stereotypes and discrimination that hamper their success in running for office and getting elected. UN Women is supporting measures to remove these barriers.

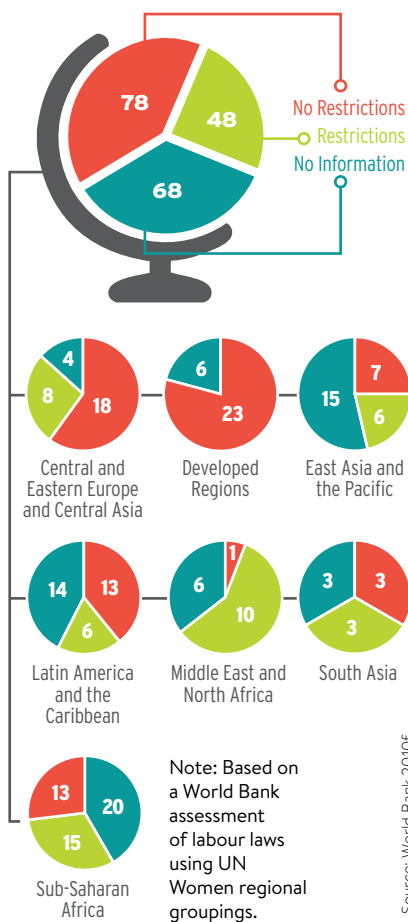
In India, the constitution stipulates that one-third of seats in village councils, or panchayats, be filled by women. In the world's largest democracy, there are now more than 1.5 million women on village councils raising their voices and carrying through new initiatives such as clean water and sanitation

“Today more women are engaged in politics and there is growing acknowledgment that the most effective political leadership represents all, not half, of society.”

LEGAL RESTRICTIONS ON WOMEN'S RIGHT TO WORK



IN OVER ONE THIRD OF COUNTRIES ASSESSED, WOMEN ARE PROHIBITED FROM WORKING IN SOME OF THE SAME INDUSTRIES AS MEN.



that respond to the demands of women in their villages. Through public support, women candidates have developed effective election campaigns and won election and re-election to such influential positions as village head, or *sarpanch*, in several states throughout India. And these women will now be able to share experiences and learn from each other through a new regional online platform that supports women's leadership. The Regional Centre of Excellence on Gender Responsive Governance, just launched by UN Women, serves as a virtual network and resource center for women leaders in South Asia, especially those at the local level.

In Papua New Guinea, women made history in 2012 when three female candidates won seats in the male-dominated parliament. Two of the successful candidates, including the very first woman to represent her region, participated in the 'Know Your Woman Candidate 2012,' which familiarised voters with the candidates through extensive media coverage, raised public awareness of

the election, and highlighted female candidates' political platforms.

Today more women are engaged in politics and there is growing acknowledgment that the most effective political leadership represents all, not half, of society. By connecting women virtually through online platforms, increasing public awareness of women's leadership through local campaigns, and creating familiar media personalities for female candidates, women are bringing their political participation into the mainstream.

Another priority that depends on strong public engagement and diplomacy is ending violence against women. UN Women supports activities from advocacy to government partnerships and public awareness campaigns to end this human rights violation.

In Palestine, the first music video to speak out against 'honour killings' was recently released by the Palestinian hip-hop group DAM to break the silence. The video is on YouTube and has attracted widespread attention. The stand taken by music groups,



artists and well-known figures decrying violence against women has contributed to building a positive culture in favour of women. In countries in every region, laws are changing, and rising numbers of women, men and young people are saying no to violence against women.

The UN Trust Fund to End Violence against Women (UN Trust Fund) is a testimony to the global consciousness that violence against women and girls is neither inevitable nor acceptable. Since its creation, the United Nations Trust Fund to End Violence against Women (UN Trust Fund) has awarded USD 95 million to 368 initiatives in 132 countries and territories. The UN Trust Fund currently supports 77 programmes in 70 countries with a value of USD 55.5 million.

These programs and initiatives illustrate a common aim: to engage the public in finding real and lasting solutions to complex problems facing women and societies worldwide. Through public diplomacy, bolstered by social media, individuals are exercising their right to freedom of opinion and expression, contributing to social and political change. The ideas articulated in the Universal Declaration of Human Rights, the Convention to End All Forms of Discrimination against Women, and the Platform of Action of the Fourth World Women's Conference in Beijing – to advance the equal rights of men and women

– are now spreading faster than ever before. Today there is greater understanding that women's empowerment and gender equality are not only goals in their own right. They are critical means to an end – economic and social progress that is just and sustainable. ♣



MS. MICHELLE BACHELET was the first Under-Secretary-General and Executive Director of UN Women, which was established on 2 July 2010 by the United Nations General Assembly. UN Women works with the entire UN system, governments, civil society and the private sector to advance women's empowerment and gender equality

worldwide. Ms. Bachelet most recently served as President of Chile from 2006 to 2010. A long-time champion of women's rights, she has advocated for gender equality and women's empowerment throughout her career. She also held ministerial portfolios in the Chilean Government as Minister of Defence and Minister of Health. As Defence Minister, Ms. Bachelet introduced gender policies to improve the conditions of women in the military and police forces. As Minister of Health, she improved primary care facilities with the aim of ensuring better and faster health care response for families.



**ANOTHER
PRIORITY OF
UN WOMEN
IS ENDING
VIOLENCE
AGAINST
WOMEN.**

THE ACCIDENT THAT PROVED THE BIG BANG THEORY

Humanity's understanding of the universe took a giant leap forward 50 years ago when two astronomers stumbled upon the most convincing proof of the Big Bang theory.

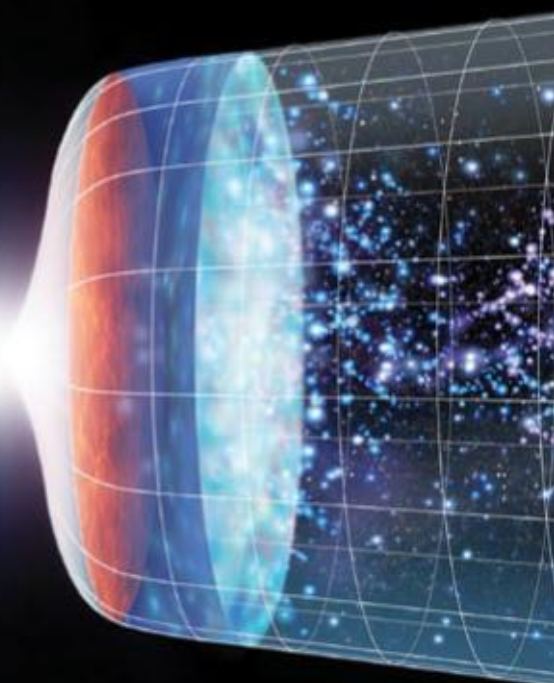
BIG BANG

The Universe expanded rapidly during a period known as inflation

DARK AGES

FIRST STARS

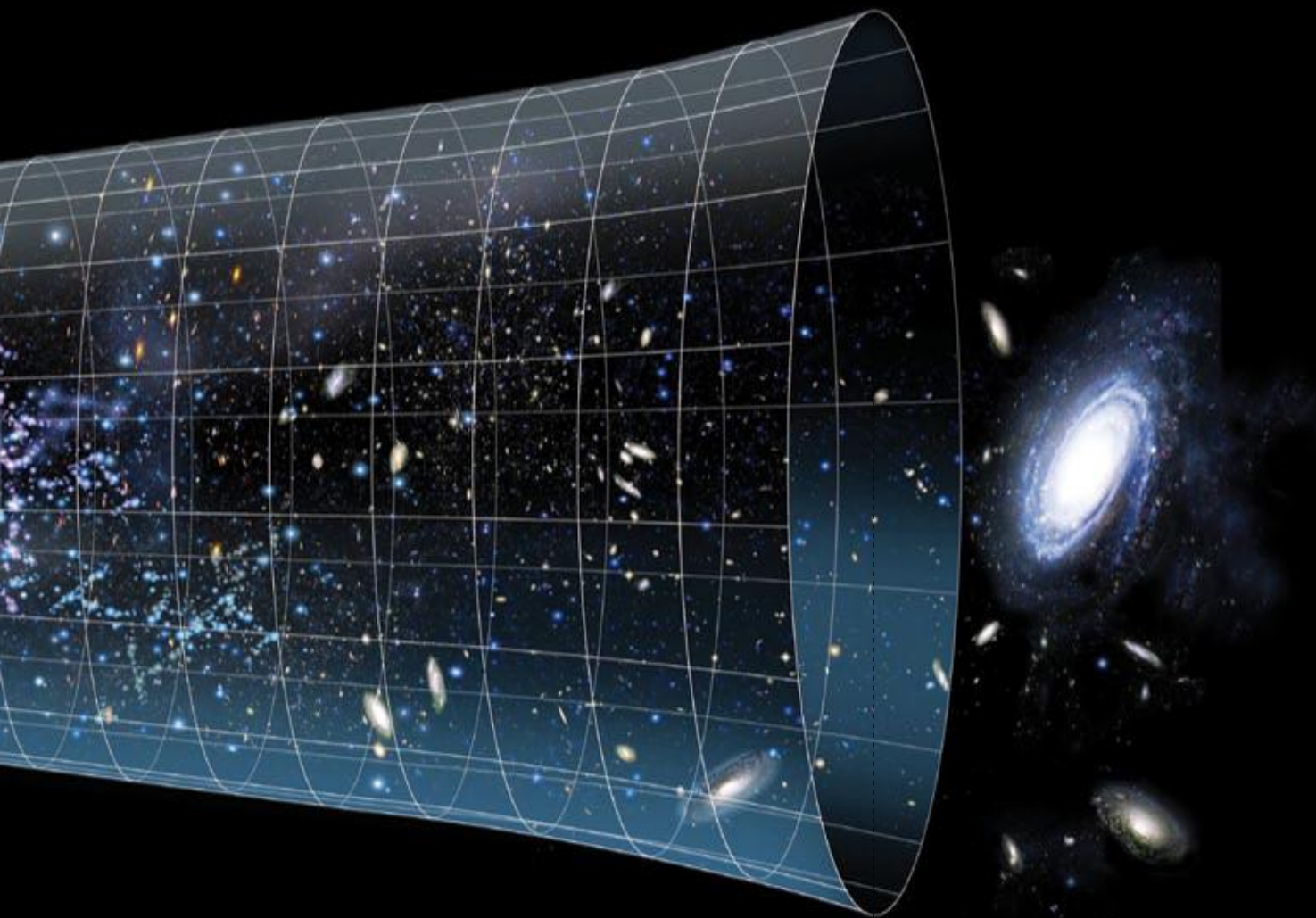
About 400 millions years



Development of Galaxies etc.

The **SOLAR SYSTEM** forms

TODAY



BIG BANG EXPANSION
13.7 BILLION YEARS



n May 20, 1964, radio astronomers Robert Wilson and Arno Penzias discovered the cosmic microwave background radiation (CMB), the ancient light that began saturating the universe 380,000 years after its creation. And this colossal discovery was an accidental one.

It all started when Bell Labs built a giant antenna in Holmdel, New Jersey, in 1960. The antenna was part of a very early satellite transmission system called Echo. By collecting and amplifying weak radio signals bounced off large metallic balloons high in the atmosphere, it could send signals across long distances.

Two employees of Bell Labs had had their eye on this antenna. Arno Penzias and Robert Wilson wanted to use it to further their own research. They got their chance in 1962 when the Telstar satellite was launched. Telstar had its own in-built transponders freeing up the Holmdel antenna for Penzias' and Wilson's research. At that time, the astronomers were studying the use of masers (microwave amplification by stimulated emission of radiation) to amplify and measure radio signals from the spaces between galaxies and thought the Holmdel antenna would also make a great radio telescope.

When Penzias and Wilson began to use the antenna as a telescope they found there was a persistent background 'noise' (like





static in a radio). This annoyance was a uniform signal in the microwave range, seeming to come from all directions. They assumed it came from the telescope itself, which was not unusual. While the buzzing had not interfered with the Echo system, Penzias and Wilson had to get rid of it to make the observations they planned. They checked everything to rule out the source of the excess radiation. Pointing the antenna right at New York City ruled out that the sound was urban interference; the radiation was not from our galaxy or extraterrestrial radio sources or even the pigeons living in the big, horn-shaped antenna. Penzias and Wilson cleared out the birds living there and swept out all their droppings to be doubly sure. Despite all their efforts,

Above (l-r): Robert Wilson; Arno Penzias
Left: Holmdel horn antenna

Below: Robert Dicke



1978 Physics Nobel press conference. Wilson (centre) and Penzias (right) were announced as recipients of the award.

The astronomers checked everything to rule out the source of the excess radiation.



AT FIRST, THEY THOUGHT PIGEON DROPPINGS ON THE INSIDE OF THE ANTENNA CAUSED THE ANOMALY.



the source remained the same through four seasons. The astronomers had to conclude it was not the machine and neither was it some random noise causing the radiation.

Penzias and Wilson began looking for theoretical explanations. Around the same time, Robert Dicke at nearby Princeton University had been pursuing theories about the Big Bang. He had elaborated on existing theory to suggest that if there had been a big bang, the residue of the explosion should by now have taken the form of a

low-level background radiation throughout the universe. Dicke was looking for evidence of this theory when Penzias and Wilson got in touch with his lab. He shared his theoretical work with them, admitting resignedly to his fellow-researchers that they had been beaten.

Ironically, Robert Wilson had been trained in steady state theory (which suggested the universe was without beginning or end, unlike big bang theory), and he felt uncomfortable with the big bang explanation of their radio noise. When he and Penzias jointly published their research with Dicke, the Bell Lab researchers stuck to 'just the facts' – simply reporting their recorded observations.

It is also ironic that many researchers prior to Wilson and Penzias had stumbled upon this phenomenon before, but either discounted it or never put it all together. This was partly because in the 1950s, the study of the early universe was widely regarded as not the sort of thing to which a respectable scientist would devote his time.

Penzias, Wilson, and Dicke's work changed all that. The measurement of cosmic background radiation combined with Edwin Hubble's much earlier finding that the galaxies are rushing away, makes a strong case for the Big Bang theory. Arno Penzias and Robert Wilson received the Nobel Prize in physics in 1978 for their discovery and today precise measurements of the CMB are critical to cosmology. [↑](#)



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