

2020–21

Outlook

Explore the
world in 2050

Productive, healthy,
green and wild. The
future according to
Imperial

GO TO PAGE 10

Everything
is for people,
humanity and life

Interview with
Professor Mary Ryan,
zero pollution hero

GO TO PAGE 23

Meet future leaders

Imperial students on
why understanding
climate change
is essential for
tomorrow's careers

GO TO PAGE 26



Foreword

The coronavirus pandemic has affected everyone in our community and our hearts go out to those who have lost loved ones or suffered the severe effects of the disease.

The crisis has exemplified the power of coming together and working collaboratively to support our community. It has shown the importance of science and factual evidence and the need to prepare in advance for the future. As we begin to hope for the control of the pandemic, and we redefine our ways of living and working, now is the time to ensure that we are preparing appropriately for the future.

Worldwide, people are experiencing disruption and loss linked to climate change, environmental degradation and health and economic inequality. As we work through this global crisis, we must reinvigorate our ambitions for a greener, more equitable world.

The work of the Grantham Institute, like that of our epidemiologists and virologists, provides science for governments and policymakers around the world. In these pages you will see highlights illustrating the excellent research carried out at the Grantham Institute along with a compelling vision for the world in 2050.

Global cooperation is vital to this important work and we are proud to lead initiatives like the COP26 Universities Network that engages our UK academic colleagues with the UN Climate Conference in Glasgow in November 2021.

Our College Strategy 2020–2025, centred around our new Academic Strategy, has Transition to Zero Pollution as a priority. This will propel us into new integration of research, education and innovation across the College. We will soon launch our Sustainability Strategy, to connect our academic agenda to our College operations and activities in order to strengthen our commitment to leaving the planet in a better condition than the one we found it in.

Finally, I am glad to welcome Professor Ralf Toumi as the new Co-Director of the Grantham Institute. He will build upon the great leadership of Professor Joanna Haigh.

Please enjoy this excellent publication. ■



Professor Sir Brian Hoskins is Chair of the Grantham Institute

Contents

Introduction	3
Highlights of 2019–20	4
Climate changed	6
Designing the future	10
Pandemic to net zero	14
Focus on COP26	18
Interview: <i>Professor Ralf Toumi,</i> new Institute Co-Director	22
Interview: <i>Professor Mary Ryan,</i> College champion for Zero Pollution	23
Year in numbers	24
Training leaders of the future	26
Study at Imperial	28

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INTRODUCTION FROM THE CO-DIRECTOR

MARTIN SIEGERT FRSE
*Professor of Geosciences and
Co-Director of the Grantham Institute*

Now, more than ever, our urgent message for those in power is to take decisive action to halt climate change. This unusual year has sailed by and, while the world changes, the Grantham Institute has been finding new ways to deliver research, teaching, innovation and evidence on climate change action.

Our work requires strong leadership from all areas of the College. So it is great to welcome a new Co-Director, Professor Ralf Toumi (inset picture and profile, p22), who brings extensive expertise on the physics of climate change and the impact of extreme weather. Together, we look forward to another successful year for the Grantham Institute.

We are also delighted to appoint Dr Joeri Rogelj as Director of Research. Having already contributed extensively to our high-profile, high-impact climate change research and policy engagement, he will help to renew our strategy for vital interdisciplinary research.

Experts are officially back 'on trend', with widespread recognition for science-led coronavirus policies. Climate action needs a similar approach, so we formed a UK-wide group of more than 50 universities to support the government's Presidency of the United Nations Climate Summit, to be held in Glasgow in November 2021 (see p18–21). We have also



launched a campaign to share evidence on biodiversity loss and the value of nature, ahead of the UN Biodiversity Conference in Kunming, China.

In the summer, the Black Lives Matter movement led us to consider how important decision-making regularly fails to include the people most negatively affected by a changing planet, and the part we must play in

correcting that. We are working to understand what motivates people from different backgrounds to engage with environmental issues, elevate the representation of diverse perspectives and experiences, and include them in our organisation and objectives.

We are enormously proud that our Climate Change, Management and Finance MSc, developed and led by Dr Mirabelle Muïls, won two prestigious industry prizes at the

Finance for the Future Awards, run by the Institute for Chartered Accountants in England and Wales. This Master's course now has more than 100 students enrolled, with gender balance and representation from more than 25 countries. Our students, we hope, will dedicate their careers to the net zero-carbon transition of the next 30 years.

Our work to stimulate and support early-stage entrepreneurship and commercialisation continues apace, with investors increasingly seeking out climate change solutions. We are stepping up our ambition and raising funds to create a Centre for Climate Change Innovation for London (see p10). The next year should see the first businesses graduating from our renewed activities.

As ever, in this pivotal year, we are focused on contributing to a cleaner, greener, fairer future. Please contact us if you are interested in collaborating on an existing project or to explore an idea for the future. ■





HIGHLIGHTS

The Grantham Institute's vision is for a sustainable, resilient, zero-carbon society. These highlights show just some of the progress towards that goal in 2019–20.

① Comment on COVID-19 spreads worldwide

Imperial is a global scientific and opinion leader on the COVID-19 virus and spread of the pandemic. The Grantham Institute has contributed to thinking about the role of local government in creating new green jobs, the benefits of active travel and cycling safely in the city, the mental health benefits of green spaces and what the pandemic can teach academics about how to communicate climate modelling. Researchers have also published new scientific data about the effect of lockdown on planetary health and advised government about the benefits of a green recovery, as well as answering questions directly from the public.



WATCH

COVID-19: A HOPE FOR OUR NATURAL WORLD? DISCUSSION WITH IMPERIAL'S DR MORENA MILLS, GRANTHAM INSTITUTE'S DR JOERI ROGELJ, AND JUDY LING WONG OBE (PICTURED), HONORARY PRESIDENT OF THE BLACK ENVIRONMENT NETWORK



② Vows renewed in partnership with Sainsbury's

During the last ten years, Imperial's research partnership with Sainsbury's, supported by the Grantham Institute, has sought to reduce the carbon footprint of one of the largest food retailers in the UK. This year Sainsbury's committed to cutting its operational carbon emissions to net zero by 2040 and extended the partnership with Imperial for another five years. The Grantham Institute brought together researchers in engineering, design, public health and behaviour change to learn more about the supermarket's goals for sustainability. They then discussed ideas for collaborative research to address challenges including reducing plastic waste and energy consumption and adapting to a warming climate.

©Sainsbury's Plc

FIND OUT MORE
[ABOUT THE IMPERIAL-SAINSBURY'S PARTNERSHIP](#)



3 Poetry tackled nature in online slam

In a new collaboration to highlight people's relationship with the environment, the Grantham Institute organised a poetry competition (or 'slam'). The event gave a platform for spoken-word artists to talk about the natural environment and climate change during the first ever socially distant Imperial Lates event: [Back to Nature](#). The slam crowned **Elle Dillon-Reams** as its first winner. The Grantham Institute's **Dr Robin Lamboll**, who is an award-winning poet, also gave a performance.



WATCH
[NATURE SLAM ON YOUTUBE](#)



5 Health and climate allies stood together at COP25

Integrating health and climate policy, often referred to as the 'co-benefits' approach, effectively cements commitment to protect human civilisation and the health of the planet. At the 25th UN Climate Summit (COP25) in Madrid, the [Grantham Institute](#) convened experts from the international Climate and Clean Air Coalition, Sweden, Mexico, Cote d'Ivoire and the United States to discuss how highlighting the implications of health issues like air pollution can raise the enthusiasm for tackling climate change. Imperial expert **Professor Paolo Vineis** addressed the audience about the links between diet, human health and the health of the planet.



READ MORE
[BLOG BY PROFESSOR VINEIS](#)

4 UK warned about warming Arctic

In a year of record-breaking temperatures in the Arctic Circle, where temperatures reached 38°C, **Professor Martin Siegert** has drawn attention to the immediacy of the problem and what it means for the United Kingdom. The Grantham Institute Co-Director led the publication of a briefing note with the UK Foreign, Commonwealth & Development Office, and top polar experts. It called for a 'strategic priorities fund' to better understand how global warming will change the Arctic and affect the UK. The authors' recommendation for a UK Arctic science strategy has gained the support of Parliamentarians and various government departments.



READ MORE
[WHAT RECORD-BREAKING TEMPERATURES IN THE ARCTIC MEAN FOR THE UK](#)



6 The burning case for a Green New Deal

"The world is on fire", warned award-winning journalist **Naomi Klein**, speaking at an event hosted by the Grantham Institute and the Institute for Public Policy Research. Fellow speaker 15-year-old **Scarlett Westbrook**, of the UK Student Climate Network, said: "The less privileged will disproportionately bear the brunt of climate change." However, Shadow Secretary for Business, Energy and Industrial Strategy and Labour MP for Doncaster North, **Ed Miliband**, said: "Lots of people don't have access to the kind of things they need to make [lifestyle] changes – such as healthy food or electric cars". Together, they made the case for a Green New Deal, a visionary political agenda that aims to tackle climate change and social inequality.



WATCH
[DISCUSSION WITH NAOMI KLEIN AND ED MILIBAND](#)



OUTLOOK 2020–21
CLIMATE CHANGED

CLIMATE CHANGED



Fast fashion: This exhibition of garments made from street-litter communicating the crisis of wasted resources appeared in Imperial's South Kensington Campus Main Entrance. It was part of The Earth And Me (TEAM), a project by the Grantham Institute's first Artist-in-Residence, Áinne Burke in January 2020.

© Thomas Angus/Imperial College London



Climate change is already affecting our world. Extreme heat events have continued with an Arctic heatwave, devastating wildfires in Australia and the United States and alarming evidence of melting glaciers across Antarctica. Although the link may appear obvious, scientists have only recently been able to confidently state that climate change is an attributing factor in causing these events. Evidence from corals and ancient forests is helping to better understand where today's climate fits in with past and future changes. More

evidence and first-hand experience, in line with scientists' expectations, has raised the profile of the problem. A flurry of polls sought to understand peoples' attitudes to climate change and the good news is that most still want to see changes, despite the COVID-19 pandemic stoking a renewed priority for health and economic concerns. These signals give policymakers and businesses the license they need to embrace a cleaner, greener, fairer future, as well as to prepare and manage the impacts of climate change appropriately. ■

DR BONNIE WARING

PROFILE



*Senior Lecturer at the
Grantham Institute and
Department of Life Sciences*

Dr Bonnie Waring recently relocated from Utah in the United States to London with her husband, young daughter Ramona and cat Fluffles the Hun to join the Grantham Institute. She brings with her a laboratory studying how carbon flows between plants, soils, and the atmosphere, to better understand how an imbalance leads to climate change.

While COVID-19 held up her move, Dr Waring led the publication of a discussion paper on the role of forests, in which she exposed the potential environmental, economic and societal benefits of planting trees as part of the global efforts to limit climate change. However, forests are complex and poor planning can increase carbon emissions. She says: "Trees should only be planted in areas

that naturally support forest – planting on grasslands, peatlands, or in tundra ecosystems can have unintended consequences that enhance warming." She warns that if trees are viewed simply as carbon absorbing machines, without consideration of their other environmental benefits, this can lead to perverse incentives for planting schemes that can damage the environment and worsen climate change. "Felling existing forests to plant monocultures of fast-growing tree species would likely lead to a net increase in atmospheric carbon dioxide and a loss of biodiversity," she says.

Dr Waring is keen to engage policymakers and the public with her research and spoke to an audience of both during London Climate Action Week in July 2020. ■

READ MORE
[WHAT ROLE CAN FORESTS PLAY
IN TACKLING CLIMATE CHANGE?](#)



SCIENCE CONFIRMS: CLIMATE CHANGE INCREASES THE RISK OF WILDFIRES

Research from Imperial and the Grantham Institute is shedding new light on the risks that climate change poses to human society and how to avoid its worst effects.

Rising global temperatures, more frequent heatwaves and associated droughts in some regions increase the likelihood of wildfires by stimulating hot and dry conditions, promoting fire weather.

Professor Colin Prentice, Director of the [Leverhulme Centre for Wildfires, Environment and Society](#), says: “Wildfires can’t be prevented, and the risks are increasing because of climate change. This makes it urgent to consider ways of reducing the risks to people. Land planning should take the increasing risk in fire weather into account.”

In light of devastating Australian fires, a [review](#) of 57 studies about global climate change and wildfires, co-authored by Imperial’s Professor Prentice, concluded there was firm evidence that the hot and dry conditions brought about by human-induced warming increased the risk of global wildfires. Studies like



Fighting a forest fire in Siberia (© Tatiana Bulyonkova CC-BY-2.0)

this also show how measures, such as land management decisions, can prevent risks turning into fires.

The Grantham Institute stresses the importance of investing in solutions to climate change. **Alyssa Gilbert**, Director of Policy and Translation at the Grantham Institute, says: “It is the responsibility of governments around the world to take note and prepare properly for these expected changes.

We need to make all of our systems – from agriculture, through to infrastructure, as well as softer networks, like social networks and connections – resilient to these changes.” ■



[READ MORE
CLIMATE SCIENCE RESEARCH HIGHLIGHTS](#)

GEOLOGICAL FINDS SHED LIGHT ON CLIMATE OF TODAY

Researchers have discovered temperate forest soil from the Cretaceous period, 90 million years ago, in Antarctica and an analysis of the preserved roots, pollen and spores points to a warmer prehistoric world. Imperial’s **Professor Tina van de Flierdt** says: “Even during months of darkness, swampy temperate rainforests were able to grow close to the South Pole,” suggesting the average temperature was around 12°C and it was unlikely the continent had an ice cap.

To better understand the history of the West Antarctic ice sheet, a UK-Chilean collaboration, including Professor van de Flierdt and Grantham Institute Co-Director **Professor Martin Siegert**, plans to drill deep into Antarctica to obtain the first ever samples of sediments from a lake buried below the thick ice.

This will help to answer questions about whether the West Antarctic ice sheet collapsed during past warm periods, and how life can adapt to extreme environments. ■

50 BILLION YEARS OF EVOLUTION UNDER THREAT

Unique animals with long evolutionary histories, such as tapirs and pangolins, are under increased threat of extinction around the world.

A study led by the Zoological Society of London (ZSL) and Imperial highlights many species that face unprecedented pressure from human activities such as urban development, deforestation and road building. In addition to being vital for their local ecosystems, some species, such as pangolins, carry variants of diseases that can transfer into humans if they come into close contact, as COVID-19 did in 2019.

Lead author **Rikki Gumbs**, of ZSL's EDGE of Existence programme and the [Science and Solutions for a Changing Planet Doctoral Training Partnership](#) at Imperial, says: "Our analyses reveal the incomprehensible scale of the losses we face if we don't work harder to save global biodiversity." In total, at least 50 billion years of evolutionary history is under threat across all land vertebrates, and the co-authors call for them to be a priority for conservation. ■

EXPLORE
[ONEZOOM TREE OF LIFE APP](#)

WATER MANAGEMENT AND FLOODING CHALLENGE GROWS

Imperial's public affairs hub, [The Forum](#) held its first online workshop on water management in June 2020.

Attendees heard **Professor Nick Voulvoulis** warn that water supply could fall by 7% by 2045, thanks to climate change, while three billion litres leaks every day in England and Wales.

"Water management and flooding must be balanced with the needs of people and nature, on national, regional and local levels," said **Dr Ana Mijic**, who recently completed a Natural Environment Research Council Innovation Fellowship, working with the UK's Environment Agency to develop a systems approach for water management that can underpin the government's '25 Year Environment Plan'.

Imperial's **Dr Jimmy O'Keeffe**, part of [Community Water Management for a Liveable London \(CAMELLIA\)](#) programme, explained how stakeholder

engagement is vital to ensure the longevity of projects that harness nature to improve the built environment. CAMELLIA co-sponsored a report by think tank Policy Connect, which details how to make new and existing homes more adaptable to the effects of climate change, making recommendations for better water efficiency, flood resilience and drainage sustainability.

On a global scale, the authors of a new [briefing paper](#) found that natural coastal ecosystems like mangroves and coral reefs protect local economies and coastal settlements from flooding, while also making a contribution to slowing climate change. ■



READ MORE
[RESILIENCE FOR ENGLAND'S HOMES](#)

Ones to watch

1

The [Environmental Research Group](#) has joined Imperial, creating an unrivalled centre in the study of air pollution. **Professor Frank Kelly**, top advisor to the UK government, leads the group that shaped London's congestion charge and Ultra Low Emissions Zone (ULEZ). Imperial plans to build on this extraordinary concentration of expertise, which itself comprises 68 researchers, by collaborating with existing world-class experts in [NExAir: Imperial's Air Quality Network](#).

2

Imperial earth scientist **Professor Chris Jackson** will be the first Black person to present one of the Royal Institution's renowned Christmas Lectures. In the series, famous for popularising science for a young audience and televised on the BBC, he will discuss climate change history and the natural and human processes that drive it. "Role models who positively inspire and support people play a big role in empowerment," he says. "If Black children don't see Black scientists in the news or in documentaries [...] it's easy for them to feel that the scientific space isn't for them."

3

A new collaboration between Imperial's Institute of Global Health Innovation and the Grantham Institute will examine the effects of climate change on mental health and transform our understanding of how the challenges affecting our planet also affect minds, communities and healthcare systems. Neuroscientist **Dr Emma Lawrance**, designer **Pip Batey**, and the rest of the Climate Cares team will first examine 'solastalgia', distress about the transformation of homelands, and 'eco-anxiety', the chronic fear of environmental disaster.



**CITIES ARE HEALTHY,
PRODUCTIVE AND
SELF-SUFFICIENT**

**BUILDINGS ARE SMART AND RESPONSIVE, ABLE
TO GENERATE ELECTRICITY, PRODUCE FOOD,
STORE CARBON AND CLEAN THE AIR AROUND THEM**

**TRANSPORT IS FLEXIBLE AND
MULTIMODAL; THE STREETS ARE
DESIGNED FOR WALKING AND CYCLING**

**FOOD IS GROWN
LOCALLY IN CITY
CENTRES AND
NEVER WASTED**

**THE CIRCULAR
ECONOMY IS
KING – ALL WASTE
MATERIALS ARE
REPURPOSED**

**MARINE AREAS
ARE PROTECTED,
PRODUCTIVE AND
POLLUTION-FREE**

DESIGNING THE FUTURE

RURAL AND
COASTAL AREAS
ARE BIODIVERSE
AND BALANCED

PRECISE FARMING
IMPROVES
BIODIVERSITY AND
SOIL HEALTH, AT
THE SAME TIME AS
INCREASING YIELDS

All parts of society must adapt to tackle climate change, meaning there are many exciting opportunities for businesses and entrepreneurs. Our startup accelerator has been growing insightful ideas into thriving businesses for more than ten years, helping innovators raise more than \$250 million to nurture their enterprises and see them succeed.

The Grantham Institute is delighted to have secured more than £4.5 million from banking firm HSBC and the European Regional Development Fund (ERDF) to continue this work for another five years.

The Greenhouse is the name for this new accelerator programme, which is taking in its first startups in January 2021.

In parallel, plans to create wide-ranging programmes and a physical hub for climate change innovators have won support from the Mayor of London. A new Centre for Climate Change Innovation (CCCI) will bring together financiers, entrepreneurs, policymakers, NGOs and other parts of civil society to drive innovation, change and help London and the United Kingdom capitalise on the opportunities in creating a resilient, zero-carbon society. Business and philanthropists who are interested in getting involved or connecting with innovators, should contact Dr Sarah Flew, Deputy Director of Development, on s.flew@imperial.ac.uk. ■

THE WORLD IN 2050, MAPPED BY IMPERIAL INNOVATORS

A lot can happen in 30 years. Remember 1990, without cheap short-haul flights, mobiles were the size of bricks and no Google, Amazon, Facebook or Netflix?

The previous 30 years have also shown that unsustainable development has widened the gap between ‘haves’ and ‘have nots’, plundered the natural environment, fuelled climate change and devastated biodiversity. Most recently, the COVID-19 pandemic has upended the modern world. So, do we now return to normal or choose to change?

Given this challenge, the Grantham Institute created an interactive feature that asked: “What kind of world do we want to inhabit in another 30 years?”. Speaking about the feature (see image, left, and explore [online here](#)), Digital Communications Officer Lottie Butler says: “*The World in 2050* came from a simple question: ‘What would the

world look like if we successfully limit climate change?’. It offers a positive future vision by exploring ideas, technologies and opportunities that exist today in the context of the next 30 years. These technologies have the potential to transform humanity’s relationship with the planet and create prosperity, helping to build a cleaner, greener, fairer future.”

Startups that inspired the interactive feature include Arborea, whose founders have developed a technology that facilitates the growth of microscopic plants to produce healthy food ingredients, all while generating oxygen and absorbing large amounts of carbon dioxide; and Lixea, who have commercialised a process that enables wood waste to be used for the production of renewable chemicals, materials and fuels. ■

Explore the world in 2050: Working with Imperial’s TechForesight team and Grantham Institute colleagues, Digital Communications Officer Lottie Butler worked with designer Matthew Hart to develop an interactive feature to bring to life the best ideas and products designed by inventors, entrepreneurs and startup companies supported by the Grantham Institute, which could transform our relationship with the planet.

EXPLORE
[WORLD IN 2050 INTERACTIVE FEATURE](#)

©Designed by Matthew Hart for Tech Foresight / Grantham Institute



SCIENCE FICTION SHOWS FAR-OUT VISION FOR A GREEN FUTURE

There are many uncertainties to consider when planning the transition to a clean, green future, and reality rarely follows a predictable path.

The Grantham Institute's **Dr Ajay Gambhir** and **Dr Joeri Rogelj** have investigated how to use different methods of 'futures analysis' to better understand our dynamic world and anticipate hard-to-imagine hurdles or unseen opportunities in the quest to halt climate change.

They have written a briefing paper with ClimateWorks Foundation in which they show that using qualitative scenarios, expert judgements, simulation and agent-based models, and even science fiction narratives,

can produce more imaginative, but also realistic predictions when planning for the zero-carbon future. "Policymakers," they write, "should be aware of, and prepare for, the full range of potential challenges that will face their mitigation strategies in the coming years as a result of future developments." ■



[WATCH THE ANIMATION](#)



[READ MORE
FUTURES ANALYSIS BRIEFING PAPER](#)



© Designed by Fat Panda (Nic Flat) for the Grantham Institute

PODCAST: ACCELERATING TO A BETTER FUTURE

A new podcast series celebrates the work of the Grantham Institute's accelerator programme, with stories from successful entrepreneurs who have transformed bright ideas into useable products that create prosperity and help tackle climate change. Contributors include **Solveiga Pakštaitė**, founder

& Director at Mimica, **Elena Dieckmann**, co-founder & Head of Innovation at Aeropowder, and **Naveed Chaudhry**, Head of The Greenhouse at the Centre for Climate Change Innovation. ■

[SUBSCRIBE TO THE PODCAST](#)

THE TYRE COLLECTIVE CURBS MICROPLASTIC POLLUTION

Vehicles are a major source of pollution, even aside from the carbon emissions created by combustion engines. Every time a vehicle brakes, accelerates or turns a corner, tiny particles of the tyres wear off producing half a million tonnes annually in Europe alone, and the second largest microplastic pollutant in our ocean.

The Tyre Collective, a startup founded by Imperial students, has created a device that uses electrostatic technology to capture microplastic particles straight off the tyre. They envisage their device becoming as common as the catalytic converter, and a new environmental standard for vehicles.

“As a team, our strength lies in our diversity. We come from all four corners of the globe and bring with us a wealth of knowledge in

mechanical engineering, product design, architecture and biomechanics” explains co-founder **Hugo Richardson**.

In 2020, the team, who took part in the EIT Climate-KIC Climate Launchpad Programme, won the UK national James Dyson Award as well as prizes in Imperial’s Venture Catalyst Challenge and the Mayor of London’s Entrepreneurship Programme. ■



STUDENTS MAKE FISH-FOOD OUT OF CHEAP PLANT OILS

Fish farming, or aquaculture, is seen as a more sustainable way of satisfying the global demand for seafood – an essential source of dietary protein for at least 1 billion people worldwide. However, a third of all fish taken from the ocean are used to feed farmed fish due to the nutritious Omega-3 oils they contain.

“You need 4,200 wild caught fish to provide enough Omega-3 for just one farmed salmon during its lifetime, so if you multiply the amount of wild fish needed to support the industry it’s really alarming,” explains Imperial undergraduate **Reiss Jones**, co-founder of student-led start up **Synthesea**.

Synthesea have developed a way of using synthetic biology to convert sustainable plant oils into Omega-3. This process is up to 88% cheaper than using current methods and helps to prevent overfishing from the ocean. “We are trying to replace the use of wild fish in the system with a sustainable and cheaper alternative,” says Reiss.

Synthesea took part in the 2020 EIT Climate-KIC Climate Launchpad Programme run by the Grantham Institute. As well as winning the UK-England competition, they finished in the top-16 globally. ■

Ones to watch

4

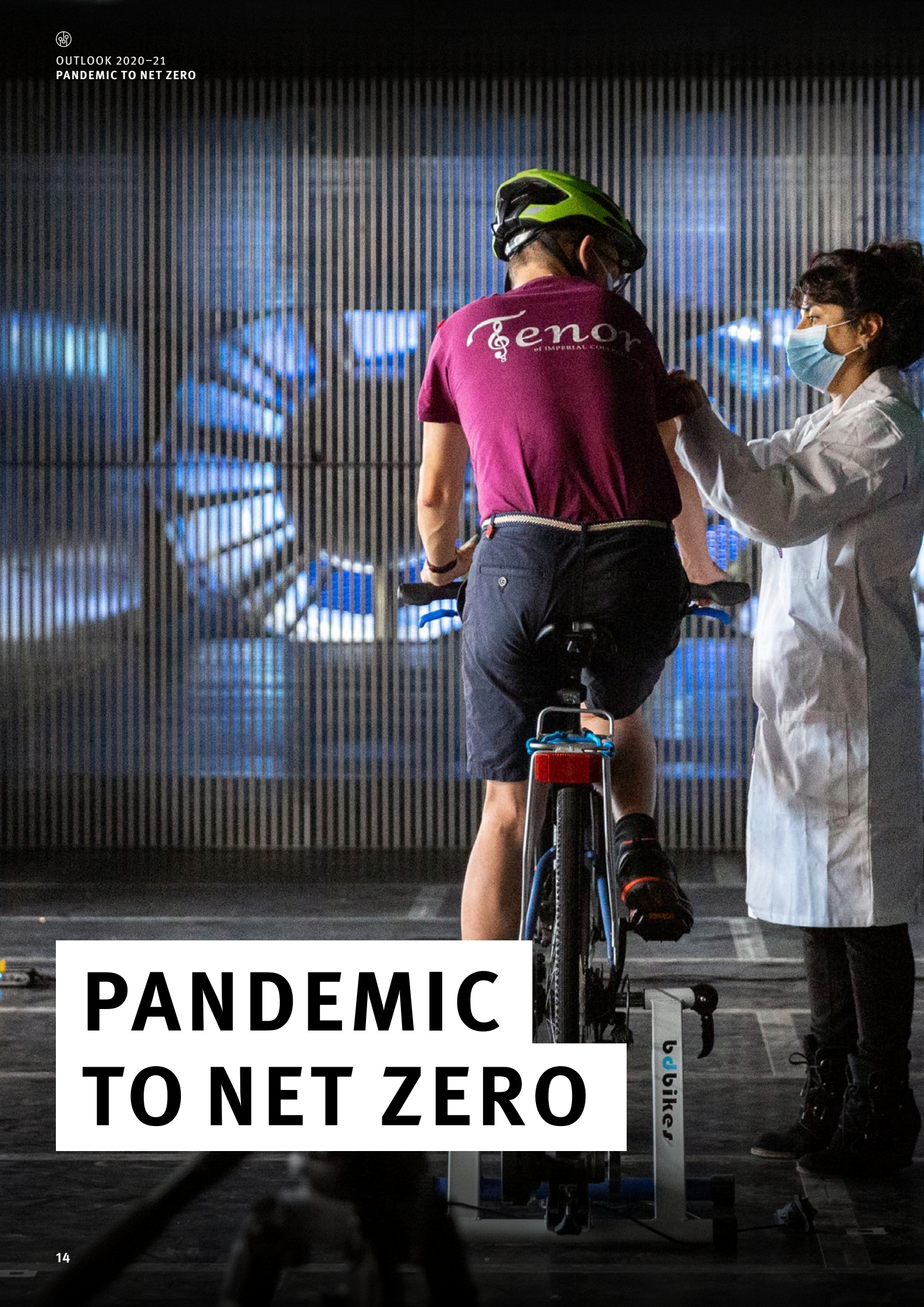
With support from the Grantham Institute, startup **Treeconomy**, founded by Master’s students **Harry Grocott** and **Robert Godfrey**, provides a one-stop-shop for landowners to earn money by planting trees to combat climate change. They use satellites to quantify the carbon captured by forests, creating a highly verifiable and trusted value as an ‘offset’ for carbon emissions. Selling certificates for carbon offsets can earn money for the landowners and provide an incentive to maintain forests. Treeconomy won the People’s Prize in Imperial’s Venture Catalyst Challenge.

5

A startup founded by students has developed an algae-based alternative that could replace microplastics commonly found in toiletries, paints and detergents. Pieces of plastic smaller than 5mm pass through water filtration systems and harm wildlife, but **Green Beads**, founded by **Lu Ai**, use non-toxic algae grown naturally in water to create biodegradable beads. Green Beads won the £15,000 top prize in the 2020 WE Innovate final, an Imperial Enterprise Lab programme to inspire and boost women entrepreneurs.

6

A team of Imperial graduates is turning waste crustacean shells into a biodegradable, compostable material, providing an alternative to plastic packaging. **The Shellworks**, founded by **Insiya Jafferjee**, **Amir Afshar** and **Edward Jones** won the Venture Catalyst Challenge top prize of £30,000. After graduating from the Accelerator, they secured paid pilots with two global cosmetics companies to make bottle caps, trays and outer packaging.



PANDEMIC TO NET ZERO

The advice of disease modelers and virologists at Imperial has shaped responses to COVID-19 at home and abroad. In the United Kingdom, the crisis catapulted experts back to the heart of strategic decision-making, with the government is opening up again to peer-reviewed evidence and well-informed debate about its policy choices. This is also important for climate action. With a foot in the door as disruption leads people to reconsider what they value, the Grantham Institute is strongly advocating for a ‘net-zero emissions’ recovery and a resilient future.

The pandemic’s unfamiliar threat meant that many countries

introduced untested responses, that saved lives but hurt economies, with the least well-off being hardest hit. The local and global dangers of climate change are well-enough understood that preparation now could avoid similarly negative outcomes. We see economic support helping people through the pandemic, building a platform for recovery, and promoting future-proofed initiatives. Rather than bolstering unsustainable practices, the right investment can deliver clean, green and fair outcomes for all, and Grantham Institute research has shown that this is achievable. ■

DR PAULO CEPPI

PROFILE



*Imperial College Research
Fellow and Grantham Lecturer
in Climate Science*

Dr Paulo Ceppi, who joined the Grantham Institute in 2018, is investigating how the climate will continue to change because of humans’ unsustainable impact on the planet.

A keen outdoor walker, who misses the mountains and glaciers of his native Switzerland, Dr Ceppi thinks climate change is a fascinating, albeit risky, experiment. “Usually we only get to see what happens when we run a model. But we’re running an experiment with the earth itself,” he says. “It’s fascinating science, but the consequences of it are all too real.”

Basic physics confirms that carbon dioxide traps heat, creating a comfortable temperature for life on earth – the so-called greenhouse effect – and that as the concentration of carbon dioxide increases, so does the temperature. However, less straightforward is ‘climate sensitivity’,

which is about how much the air warms when the carbon dioxide doubles. The effect of clouds is an important part of this conundrum, and the focus of Dr Ceppi’s research.

Solving the puzzle would mean better predictions and preparation for future global temperatures, weather patterns, extreme storms, heat-waves or droughts, as well as better estimations of how much additional carbon dioxide will lead to the 1.5 or 2°C of global warming that the Paris Agreement seeks to avoid.

“My group are developing new statistical methods to better understand how clouds respond to meteorological variations, such as local changes in temperature or humidity, using satellite cloud observations,” he says. “We have exciting new results undergoing peer-review now, which we think allow us to substantially reduce the uncertainty in climate sensitivity.” ■

READ MORE

[CLIMATE SENSITIVITY: WHAT IS IT, AND WHY IS IT IMPORTANT?](#)

Imperial’s 10x5 Wind Tunnel is normally a testing facility for aerodynamic development and safety evaluation of everything from road and race cars to aircraft, buildings and structures. During Summer 2020, Department of Aeronautics researchers led by **Professors Denis Doorly** and **Spencer Sherwin** were measuring the transmission risk of COVID-19 carrier particles during outdoor exercise.

SOUND INVESTMENT: RENEWABLES OUTPERFORM FOSSIL FUELS

Offshore wind farms built in the UK now are likely to reduce household energy bills by producing electricity very cheaply. That is the conclusion of [an analysis](#) by an international team led by Imperial experts **Dr Malte Janssen** and **Dr Iain Staffell**. They found that the most recently approved offshore wind projects are likely to operate with ‘negative subsidies’ – effectively paying money back to the government for the work they do. When the offshore wind farms start producing power in the mid-2020s, this money will go towards reducing household energy bills.

“Offshore wind power will soon be so cheap to produce that it will undercut fossil-fuelled power stations and may be the cheapest form of energy for the UK. Energy subsidies used to push up energy bills, but within a few years cheap renewable energy will see them brought down for the first time. This is an astonishing development,” says Dr Janssen.

Looking internationally, [a report](#) led by **Professor Charles Donovan**, Director of Imperial’s Centre for Climate Finance and Investment, found that

renewable power is outperforming fossil fuels in both United States and European markets. Publicly traded renewable power portfolios have achieved significantly higher returns for investors and shown less volatility compared to fossil fuels during the past ten years and during the COVID-19 crisis. The report, published in collaboration with the International Energy Agency, shows that despite the growing profile of renewables, total investment in clean energy is still well short of the level needed to put the world’s energy system on a sustainable path.

Commenting on the report, Professor Donovan said: “There’s real momentum gathering behind renewable power, based purely on the economic advantage. Our results show that renewable power is outperforming financially but has still not attracted sizable support from listed equity investors. Existing norms in the investment industry will have to change to provide savers and pensioners with better ways to participate in the upsides of a clean energy transition”. ■

THE CASE FOR A GREEN ECONOMIC RECOVERY

The choices that governments make in their COVID-19 recovery plans will shape the climate as well as economies, according to a [study](#) co-written by Grantham Institute Director of Research **Dr Joeri Rogelj**, who commented: “Out of this tragedy comes an opportunity, but, unless it is seized, a more polluting next decade is not excluded.”

In another study published in October 2020, Dr Rogelj and colleagues pointed out that global economic stimulus packages amounted to more than \$12 trillion, but only \$1.4 trillion per year would be required for investment

in climate-friendly policies during the coming years to meet the goals of the Paris Agreement.

Highlighting the policies and actions required to ensure a green economic recovery, the Grantham Institute joined local authorities, NGOs and universities as signatories to [The blueprint for accelerating climate action and a green recovery at the local level](#). This report calls on the UK government to provide local authorities with the resources and power to create jobs and reinvigorate the economy while reducing carbon emissions. ■

TRACKING AND IMPROVING AIR POLLUTION BENEFITS PUBLIC HEALTH AND CLIMATE

Travel restrictions imposed during the COVID-19 crisis led to temporary improvements in air quality around the world, particularly in urban areas. A cross-university study called [INHALE](#), including work by Imperial **Professors Fan Chung, Christopher Pain** and **Alexandra Porter**, is investigating how the concentration of harmful airborne particles changed as the restrictions affected London. The findings will help to better predict how interventions, such as traffic calming measures, can affect air quality.

Meanwhile, [research](#) led by Imperial’s **Dr Anthony Laverty** has shown that walking and cycling may reduce deaths from heart disease and cancer. His study used census data to track individuals for 25 years and found that, compared with those who drove, people who cycled to work had

a 20% lower rate of early death during that 25-year period.

Dr Laverty says: “While not everyone is able to walk or cycle to work, the government can support people to ensure that beneficial shifts in travel behaviour are sustained in the longer term. Additional benefits include better air quality, (which has improved during lockdown), and reduced carbon emissions, which is crucial to address the climate emergency.”

Grantham Institute experts have written about solutions to improve air quality in briefing papers and in blogs. ■



READ MORE
[TOOLS TO ENCOURAGE LOW-CARBON TRAVEL BLOG: TOP TIPS TO GET ON YOUR BIKE AND ENJOY CYCLING IN THE CITY](#)

Ones to watch

7

As companies attempt to stop their resource-use and operations contributing to deforestation, PhD researcher **Joss Lyons-White** is investigating the impact of ‘zero deforestation’ commitments. In some highly forested countries, where agriculture is important for development and alleviating poverty, such commitments may have unintended consequences, including damage to non-forest ecosystems (such as savannahs) and negatively affect rural peoples’ livelihoods. His research points to the need for international commitments to align with national and local situations to ensure the best outcomes for people and nature.

8

Imperial’s **Dr Audrey de Nazelle** and **Dr Marc Stettler** are bringing together policymakers, academics and transport sector experts to discuss approaches to tackle transport-related air pollution. They will convene via a three-day workshop to discuss the latest research on potential transport solutions, and the challenges faced by policymakers in implementing solutions. They hope that this style of collaboration will ensure that future research focuses on finding answers to the most pressing issues.

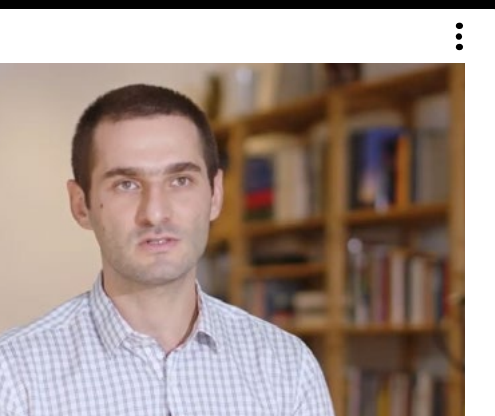
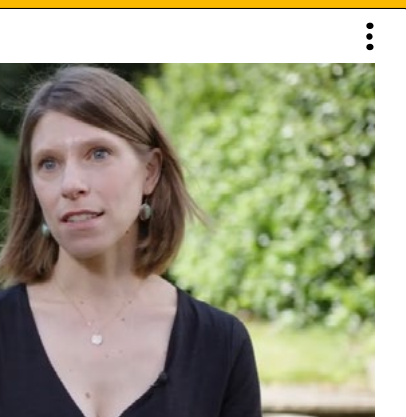
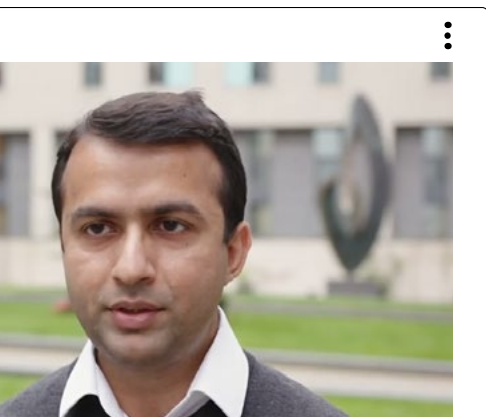
9

Imperial will be publishing its first 5-year Sustainability Strategy by the end of 2020. The strategy, led by **Professor Paul Lickiss**, is expected to set a date for achieving net-zero carbon emissions together with targets across all areas of sustainability including energy, water, waste, travel and biodiversity. The strategy will be formally launched in February 2021 as part of a Sustainability Week that brings students and staff together in a series of virtual activities and community events.



FOCUS ON COP26





Imperial voices on climate and environment: Imperial academics talk about their research, why it matters when it comes to tackling global issues like climate change and the biodiversity crisis, and how it is relevant internationally in the build up to the COP26 climate conference.

WATCH THE SERIES

As COVID-19 swept the world, the decision to delay the 26th UN Climate Summit (COP26), originally scheduled for November 2020 in Glasgow, was unavoidable. Countries could not feasibly anticipate meeting to agree increased ambition on climate change while grappling with the pandemic. However, postponing COP26 does not mean postponing climate action. A very public spotlight that recognised the need for a green recovery from COVID-19 has only

increased calls for countries to raise the bar in their climate action plans. With the United Kingdom government at the helm of the conference, now taking place in November 2021, the Grantham Institute is bringing together the expertise of UK academics to help raise ambition at COP26 on delivering a low-carbon, resilient world. Working with UK policymakers and industry partners, the Institute also aims to help make COP26 a successful catalyst for accelerated climate action. ■

SIGOURNEY LUZ

PROFILE



*IPCC Working Group III
Communications
Manager*

Imperial co-hosts IPCC Working Group (WG) III, one of three scientific units of the Intergovernmental Panel on Climate Change (IPCC), a UN body that assesses climate change science. Their reports inform governments and policymakers as they discuss and negotiate international agreements (such as the Paris Agreement) or address the continuing rise in carbon emissions.

It is the job of Communications Manager **Sigourney Luz** – she signs her emails ‘Siggy’ – to get this information in front of the right people at the right time.

“It can seem confusing to people who aren’t familiar with the process,” she says about the relationship between the IPCC and the UN Climate Conference, officially called the Conferences of Parties (COP), which is where representatives of nations (the Parties) get together to agree on the approach and look at progress already made to prevent further global warming.

During the coming year, IPCC scientists are preparing to publish their sixth

assessment report on climate change. IPCC reports are lengthy documents that demand high standards to ensure they remain the most highly trusted source of information on climate change. They also include a shorter Summary for Policymakers.

“It’s rare to reach broad agreement about such complex science,” says Ms Luz. “Approving a report is a rigorous process, and even before that stage the scientists take into consideration thousands of pieces of evidence and science, feedback from climate and policy experts, and governments from around the world. It is important to be really thorough before publishing a report.”

COVID-19 meant a delay for WG III, and their contribution to the next report is currently expected for release after COP26. But Ms Luz is hopeful that the pandemic experience means governments and people around the world appreciate that “responding together and safeguarding the planet” are common goals we all can agree on. ■

FIND OUT MORE

[IMPERIAL COLLEGE LONDON AT COP26](#)

NEW TECHNOLOGIES CAN HELP ADDRESS DIFFICULT-TO-REDUCE EMISSIONS

Meeting international climate targets requires major cuts in carbon emissions. However, some emissions – such as those from heavy industries – are hard to eliminate. That is where ‘negative emissions technologies’, which remove carbon dioxide directly from the atmosphere, may come in. The question is, what kind of solutions are the most attainable on a large scale? And which will bring benefits to wider society?

Imperial Professors **Niall Mac Dowell**, **Geoff Maitland** and **Nilay Shah** study the potential for ‘nature-based solutions’ such as tree planting as well

as technologies, including carbon capture and storage. “We are creating new industries and economies that will result in the creation and preservation of jobs and communities across the world,” says Professor Mac Dowell.

A roundtable organised by the All-Party Parliamentary Group on Climate Change, and sponsored by the Grantham Institute, also explored how to address the carbon footprint of heavy industries. Imperial’s **Dr Gbemi Oluleye** (pictured) emphasised the need for “shortening the time between demonstration of new technologies and full commercialisation” in the industrial sector. ■



© Fergus Burnett/Imperial College London



READ MORE

[TURNING CONVENTION ON ITS HEAD: HOW TO REACH NET ZERO IN THE UK](#)

EXPERTS SUPPORT POLICYMAKERS TO GO GREEN

Achieving the UK’s goal of net zero emissions by 2050 will involve people making changes to what they eat, the things they buy, and how they travel. Transport, aviation, heating and diet are areas where shifts in behaviour can deliver the largest benefits for the environment, health and the economy.

In a report for the UK Climate Change Committee, Imperial’s **Dr Richard Carmichael** outlined what new policies can support individuals and households to make such greener choices. He said: “Consumers need

support to take actions that will deliver large emissions reductions, but these need not be costly or require big lifestyle changes, and many come with co-benefits.”

The links between behaviour change and economic policy were also in focus at a discussion with members of the UK Treasury hosted by the Grantham Institute at Imperial and the Grantham Research Institute at LSE. The discussion, chaired by Imperial’s **Dr Mirabelle Muûls**, reflected on how to fairly distribute the costs of shifting to a net-zero economy. ■



READ MORE

[HOUSEHOLDS COULD MAKE BIG EMISSIONS REDUCTIONS WITH THE RIGHT GOVERNMENT SUPPORT](#)



UK UNIVERSITIES WORK TOGETHER FOR AMBITIOUS OUTCOMES AT COP26

In 2015, countries came together to agree the landmark Paris Agreement on climate change. However, scientists have calculated that initial commitments to reduce carbon emissions are not enough. COP26 is the first opportunity for countries to pledge more ambitious plans and, with the UK government hosting the summit, universities up and down the country are committed to providing evidence to support this aim.

Grantham Institute Director of Policy and Translation, **Alyssa Gilbert** (pictured), is chairing the COP26 Universities Network, a growing group of more than 50 universities collaborating to drive ambitious outcomes at COP26 and beyond.

Through a series of policy briefings, the network engages with the UK government on priority areas for cutting carbon emissions and adapting to the effects of climate change we are already experiencing, as well as engaging the public and working with partners across the world.

The network's first publication showed how a sustainable recovery from COVID-19 can help the UK reach its goal for net-zero carbon emissions by 2050. The authors, including Imperial experts **Dr Charles Donovan** and **Dr Ajay Gambhir**, put forward ten economic stimulus policies that can

create new jobs while also addressing climate change. These include investing in renewable energy infrastructure, increasing the coverage of broadband internet to allow more people to work effectively with others at a distance, and supporting 'nature-based solutions' – a term that includes projects like reforestation native trees to absorb carbon dioxide and protecting areas against flooding or overheating.

Ms Gilbert says: "The COP26 Universities Network delivers our knowledge directly into the hands of policymakers to help the UK build back better, embedding climate change concerns into creating a healthy and prosperous nation. As President of the next international climate change negotiations, the UK must demonstrate how a green economic recovery is possible."

The network has also published a paper outlining the need to create new zero-carbon opportunities for workers and communities that currently rely on polluting industries that are no longer viable – known as a 'just and socially inclusive' transition to a net-zero economy. Future publications will address the importance of setting long-term targets to reach net zero emissions and how to preempt the effects of climate change.

Members of the network are also committed to improving access to skills and training for a green economy, increasing public engagement with a net-zero future and cutting their own carbon footprint. ■



READ MORE
[BRIEFINGS ON ECONOMIC RECOVERY AND ON JUST TRANSITION](#)

Ones to watch

10

The Grantham Institute at Imperial worked with the Grantham Research Institute at LSE to appoint four researchers to assist the COP26 Universities Network. The COP26 Fellows will inform the Climate Summit through their focus on: youth engagement; non-state actors; climate finance for local adaptation; and, equitable energy system transitions. Their research activities will be shared with others in the Network, to stimulate academic communities to get involved in COP26.

11

As part of the COP26 Universities Network, the Grantham Institute is jointly organising a virtual conference on climate change to be held in spring 2021. The interdisciplinary event will bring together leading experts and researchers, policymakers and practitioners, to provide an independent forum for discussing priorities for the Climate Summit across areas such as: green recovery from COVID-19; solutions for cutting carbon emissions; adapting and resilience to the effects of climate change; and finance and nature-based solutions.

12

Following COVID-19, the need for generating green jobs to 'build back better' has never been stronger. The Grantham Institute's Campaign Manager **Katrine Petersen** and **Professor Dave Reay** from University of Edinburgh are leading a group of representatives from UK government, industry groups and the wider education sector to identify ways to create the skills and education necessary to support the UK's transition to a green economy. Through Professor Reay's membership of the government's new Green Jobs Taskforce, they will raise awareness of skills gaps and showcase opportunities during 2021 and beyond.

Professor Ralf Toumi joins the Grantham Institute as Co-Director

Professor Ralf Toumi, a physicist who specialises in the science of tropical cyclones, has joined the Grantham Institute as Co-Director. He joins the leadership team alongside fellow Co-Director Professor Martin Siebert and Chair Professor Sir Brian Hoskins.

Interview by Lottie Butler

Tell us about your research?

I started my PhD studying stratospheric ozone chemistry, and since then, I've done lots of different things in climate science. Currently, my research passion is studying tropical cyclones. Last year, my team and I made a breakthrough in seasonal forecasting. Usually, storms are forecast in March for the coming typhoon season, which runs from July to September. However, we now think we can forecast the landfall of tropical storms in South China one year ahead.

What drew you to the Grantham Institute?

The environment is a fantastic area to study. Understanding how it works underpins everything, from climate forecasts, to the global energy economy, to the impact of the environment on health and livelihoods. A lot of breakthroughs start with blue-sky thinking, and I would like the Grantham Institute to continue to enable environmental research at Imperial that breaks new boundaries.

What is the most effective way to talk to people about climate change?

Know your audience. There is no single message that will work for everyone.

My strongest engagement on climate change issues has always been with business, in particular with the energy and financial sectors. The CEO of an international bank will have very different concerns and opportunities to a low-income worker. You have to make climate change relevant to whoever you are talking to, so they can understand it in their own way and see how they fit into the story.

“The environment is a fantastic area to study. Understanding how it works underpins everything.”

What are your hopes for the College's approach to sustainability?

The College's current policy on fossil fuel investments should change to align with other Russell Group UK universities. I'm pleased to see that we now have Professor Paul Lickiss as Academic Leader in Sustainability, and that there will be a Sustainability Strategy launched and implemented soon.

What do you do to relax?

I have a West Ham season ticket and enjoy watching and going, but I cannot claim that it is relaxing. ■

Professor Mary Ryan

on being female, a scientist and a champion



Professor Mary Ryan is Imperial's Vice-Dean of Research (Engineering) and a Fellow of the Royal Academy of Engineering. She joined Imperial in 1998, where she leads a large group researching nanoscale materials.

Professor Ryan leads Transition to Zero Pollution (TZP), a new transdisciplinary research initiative that aims to eliminate pollution in all its forms, working in partnership with industry and government to realise a vision of a sustainable, zero-pollution future.

Interview by
Hana Amer

Tell us about a challenge you are currently tackling?

Getting people to understand each other's language. In my discipline, experts in chemistry, physics and fabrication are crucial to building the 'materials' system, but we need the right environment to enable people to talk and reach a common goal.

What problems might readers be unaware are affecting our environment?

Billions of images are saved on smartphones, or in 'the cloud', but data storage is made up of transistors, capacitors and exotic materials, and the infrastructure needs energy to produce and maintain. Resources like this have an environmental cost and managing our growing digital footprint is a significant challenge.

What was your vision when starting Transition to Zero Pollution (TZP)?

Everything we're doing is for people, humanity and life. The idea sprung out of discussions about exciting challenges and a common purpose. This became a research strategy with a College-wide community and energy behind it, which was a pleasant inadvertent shift. I'm lucky it's my job to champion TZP, but the staff and the students own it.

Who can tackle climate change?

I have no doubt that climate change is a reversible problem. Unquestionably we need strong political leadership to mobilise support and funding. Then scientists bring ideas, educators teach skills and engineers deliver the changes on the ground. Everyone must be properly engaged with the risks and impacts to make informed choices in our personal and work lives.

What will the world look like after we have solved climate change?

I hope we will have done it in a holistic way that enhances wellbeing, maintains prosperity and achieves equity. Former Irish President Mary Robinson calls it "the Great Re-design". We must follow through with a full vision for the revolution.

What drives you to succeed as a woman in a male-dominated field?

I try to just be authentic; there's much to do in enabling women to be themselves at work and not be constrained by ideals about how to talk, dress, connect and behave. Some advice to my younger self would be to be a bit braver, there is no right time to make choices, so don't wait around. ■

YEAR IN NUMBERS



Train

Empower future leaders through postgraduate training programmes



Innovate

Accelerate climate change innovation and low-carbon business startups



Inform

Communicate knowledge to help inform and shape decision-making



80

developing country policymakers selected to attend ‘in-person’ Clean Power Program



£1.5m

raised by seven new businesses supported by the Grantham Institute’s Climate-KIC Accelerator



3,719

downloads of policy publications and special reports



45

undergraduates enrolled on new I-STEMM Explore extracurricular module to study climate change (see p28)



10

new business ideas supported by Imperial’s Climate Launchpad programme



150

civil servants attended a climate action conference organised with Royal Meteorological Society



24

climate scientists and economists trained in media and debating skills



£4.5m

secured to run the Grantham Institute’s new accelerator ‘The Greenhouse’ for five years



5,500

views of our climate change FAQs



12

news journalists trained by Grantham Institute and Royal Meteorological Society



247

Grantham Institute experts in the media



8

Science in the City events presenting expert insights to firms with large investment portfolios

2019–20



Research

Initiate, develop and support multidisciplinary research on climate change and environment



Connect

Foster new collaborations and networks at Imperial and beyond



Lead

Generate thought leadership and forge consensus on key issues



50

funding proposals involving Grantham Institute researchers



250

Imperial staff benefit from Grantham Affiliates scheme



#7

former Co-Director Professor Joanna Haigh's position on the BBC Woman's Hour 'Our Planet' Power List



£800,000

average value of research grants awarded



19

in-person and 25 online coffee mornings connecting Imperial staff and students



1

new Grantham Institute Co-Director (see p22)



123

publications of new research in peer reviewed journals



928

staff engaged with campaign to embed climate action in local councils



50+

institutions in COP26 Universities Network, led by Grantham Institute (see p21)



21

laboratories completed 'green' baseline for Lab Efficiency Assessment Framework



50

Imperial PhD researchers met 11 national museums to explore new outreach partnership



500,620

people viewed Global Alliance of Universities on Climate Change co-organised by Grantham Institute at Imperial and Grantham Research Institute, LSE



TRAINING LEADERS OF THE FUTURE

Imperial is a one-of-a-kind university in the UK, being home to a global community of scientists, engineers, medics and business experts. Here, we meet some of the students who are using their diverse talents to find solutions to some of the world's biggest challenges – like financing sustainable energy technologies, protecting the world's endangered species and understanding past climate change.



PROFILE: Swapnil Jagtap

Science and Solutions for a Changing Planet Doctoral Training Partnership

“I like the world-class, competitive environment at Imperial”

Swapnil has been named as one of Forbes' 30 Under 30 in Europe for his research on reducing the carbon footprint of aviation. Swapnil, whose PhD focuses on ultra-energy-efficient aircraft technologies and alternative fuels, has designed a 300-passenger aircraft powered by liquid hydrogen, improving energy efficiency of the plane by more than 50%.

He also holds a patent for a heat recuperation system, which increases the performance and life of aeroplane engines.

“I have had my own fair share of setbacks and failures, but I have never really let those stymie my ambitions, passion, confidence and instincts,” says Swapnil. “I like the world-class, competitive environment at Imperial.

It keeps me motivated and fosters scientific temper and reasoning. Additionally, my peers all have different backgrounds. Engaging in a dialogue with a diverse community like this keeps refining me as a global citizen.”

Imperial trains postgraduate researchers to address society's big challenges in government-funded PhD programmes that harness academic study, talent and imagination; all supported by extensive professional development.

The Science and Solutions for a Changing Planet NERC Doctoral Training Partnership trains and inspires a new generation of experts and leaders to tackle some of the toughest environmental challenges of our time. ■

STUDENT
SUPPORT

14

FULLY FUNDED
STUDENTSHIPS
FOR 2021–22

STUDENT
NUMBERS

74

NEW PHD
RESEARCHERS
STARTED IN 2019
AND 2020

PROFILE: Nabila Putri Salsabila
Clean Power Program

“We are running out of time”

Salsa from Indonesia is a sustainable development enthusiast aspiring to be a consultant and policy-maker in the energy transition, climate action and sustainable development sector.

“Aside from providing a strong fundamental and practical set of knowledge even for non-experts in the sector, this online course has inspired young people like me to advocate for a sustainable, cleaner future, because we are running out of time,” she says.

As a result of studying on the Clean Power Program, she now serves as Regional Coordinator for the Global Youth Energy Outlook at Student Energy, a project to connect youth and the policymakers, engaging 5,000+ young people in Southeast Asia and the Pacific, ranging from civil society organisations in Malaysia, to youth-led start ups in Fiji.

The Global Youth Energy Outlook will be a first of its kind report that champions today’s youth aspirations for the sustainable energy transition and how they want to be engaged with policymakers to co-design sustainable future solutions, including cleaner power systems.

Imperial’s vision is to develop and deploy cutting edge technology to transform the learning and teaching experience.

The Grantham Institute and partners have produced three online courses about the shift to a low-carbon energy system, that are accessible from anywhere in the world and available for free on EdX. The courses cover the opportunities and advantages of clean power, the tools needed to build a global low-carbon power sector and the challenges and solutions of the energy transition. ■



LEARN MORE
ABOUT THE CLEAN
POWER PROGRAMME
AND OTHER WAYS
TO STUDY AT
IMPERIAL
ON P28.

**STUDENT
NUMBERS**

10,964

WORLDWIDE LEARNERS
ON EDX CLEAN POWER
PROGRAM
IN 2019–20



PROFILE: Lucy Carmody
MSc Climate Change, Management and Finance

“Enthusiastic, energetic and exceptional”

Lucy’s career led her from investment banking in Asia and New York to founding a research boutique assessing corporate environmental, social and governance (ESG) credentials for global institutional investors, but what was lacking was an understanding of how we are practically going to reach net-zero carbon emissions. “It’s going to be a massive transition, with new rules and regulations, and plenty of new commercial and partnership opportunities for those who are ready to take them,” she says.

Studying online from her home in the Chilterns, Lucy says: “Imperial are doing an amazing job. The course is really interactive, with good planning and communication. I have access to the library, lectures and high-quality education materials online and find it energising to discuss our modules with my cohort in the chat rooms.”

There are 102 students in 2020’s intake from 27 nationalities and an average age of 25 years. Lucy describes her course-mates as “enthusiastic, energetic and exceptional”.

Imperial places great emphasis on the integration of Master’s courses with its world class research activities. The one-year MSc Climate Change, Management & Finance, taught by the Grantham Institute and Imperial College Business School, provides graduates with the interdisciplinary skills required in business on issues relating to climate change and sustainability.



Study at Imperial

Imperial is a one-of-a-kind university in the UK, focusing exclusively on science, engineering, medicine and business. To help you explore all the ways you could advance your knowledge at Imperial, we group our Master's and Doctoral courses into four different global challenge course guides.

• [Discovery and the natural world](#)

• [Engineering novel solutions](#)

• [Health and wellbeing](#)

• [Leading the data revolution](#)

These guides are designed to help you search our courses by theme. The reason for this is that Imperial is highly interdisciplinary. As such, many of our departments welcome students from outside their exact area of expertise as long as they have a background in a relevant discipline.

So, we encourage you to use our course guides to look for courses related to your interests – it may not be in a way you previously considered or thought you might be qualified for.

The Guide to Postgraduate Study provides a helpful overview of our application process.

[Find out more here](#)

Climate change modules for Imperial students

In line with the Grantham Institute's training mission, a new I-STEMM module is launching in January 2021.

Climate Change – Science and Solutions is a for-credit undergraduate module that is part of a multidisciplinary programme called I-Explore that is open to all second and third years.

The course focuses on different aspects of climate change, covering atmospheric physics to policy, and governance to the energy transition. Students will discover how impacts are felt in different regions and communities; learn how to construct arguments about the urgency, implications and impacts of climate change, and; how to bring about solutions to the climate crisis.

Online professional development

Imperial provides professional development with best-practice guidelines, and political and technical advice from academics, legislators, policymakers, investors and civil society, all presented in an engaging and user-centred way.

The **Clean Power Program**, developed by the Grantham Institute and funded by the Children's Investment Fund Foundation (CIFF), consists of three Massive Open Online Courses (MOOCs) that are accessible from anywhere in the world and available for free on EdX. Those who complete the courses can pay a small fee to receive a Professional Certificate. Our partners include: the Digital Learning Hub, the Centre for Environmental Policy, Energy Futures Lab, and Imperial College Business School. ■

Get involved

In 2007, the Grantham Foundation for the Protection of the Environment made the visionary decision to support an Institute at Imperial to provide a vital global centre of excellence for research and education on climate change. Today, the Grantham Institute is established as a leading authority on climate and environmental science.

The Grantham Institute is one of Imperial's six Global Institutes established to promote interdisciplinary working and to address some of the greatest challenges faced by society. We drive forward discovery, convert innovations into applications, train future leaders and communicate academic

knowledge to businesses, industry and policy makers to help shape their decisions.

Our vision is for a sustainable, resilient, zero-carbon society.

Work with us

Partner with Imperial College London academics who focus on some of the most important, relevant and timely questions.

Study at Imperial

See page 28 or visit our website to find out more about Master's, PhD and professional online training programmes at Imperial College London.

Support us

If you would like to offer support or discuss the role you could play in helping us achieve our goals, please contact Gabbie Filmer-Pasco, Trusts and Foundations Manager at g.filmer-pasco@imperial.ac.uk or +44 (0) 20 7594 6128.

Come to our events

Join our mailing list to hear about research seminars and public lectures delivered by leading figures from research, business and government.

Engage with our students

Become an education partner and offer a secondment or opportunity to our brightest students.

Join our cleantech vision

Become a founding partner in our Centre for Climate Change Innovation and help to finance and shape the vision for this exciting project (see page 11). Business and philanthropists who are interested in getting involved or connecting with innovators, should contact Dr Sarah Flew, Deputy Director of Development at s.flew@imperial.ac.uk.

Become a Grantham Affiliate

Imperial staff can access funding opportunities, studentships and other support through our Affiliates scheme.

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