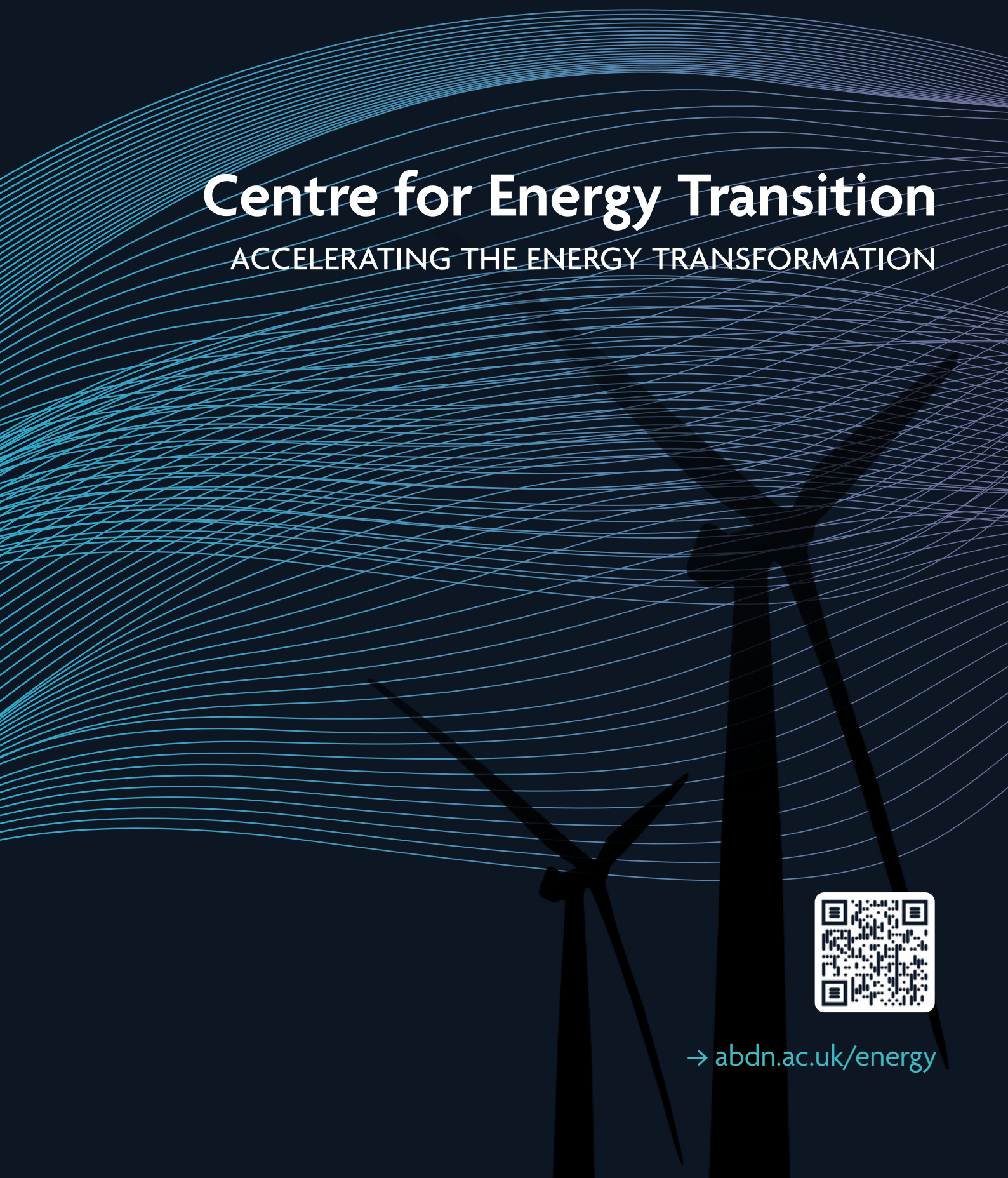
1495 UNIVERSITY OF ABERDEEN

Centre for Energy Transition

ACCELERATING THE ENERGY TRANSFORMATION



→ abdn.ac.uk/energy

The Energy Transition and its component parts of Security, Affordability and Sustainability is one of the key global challenges facing society and our way of life today. Our Centre for Energy Transition at the University of Aberdeen is committed to undertaking data-driven, evidence-based technical research to find energy solutions compatible with the UN Sustainability Goals and to provide the relevant skills training to support people and communities who seek to deliver the Energy Transition. Let us know if you'd like to join us on the journey to Net Zero.

PROFESSOR JOHN UNDERHILL
DIRECTOR OF ABERDEEN UNIVERSITY'S CENTRE FOR ENERGY TRANSITION

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Introduction

The Energy Transition represents one of the major global challenges of our time.

Energy allows for industrial growth, entrepreneurial activity and other public goods to be offered such as public health and nutrition, heating, lighting, transportation and education.
However, oil, gas and coal currently provide for more than four fifths of our global energy needs and three quarters of the UK's supplies.

Given the high carbon footprint that results from the current dependency on fossil fuels, there is an urgent need to reduce the greenhouse gas emissions their use leads to.

Research and training in the Centre for Energy Transition (CET) at Aberdeen University addresses the key challenges facing the Energy Transition as we seek to reduce emissions and enable global, national, and regional Net Zero targets to be met.

The CET combines critical research with industry-leading training to address all aspects of the energy trilemma, namely: energy security, affordability, and environmental sustainability.

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Energy Security

The International Energy Agency (IEA) define energy security as "the uninterrupted availability of energy sources at an affordable price". Electricity security is the system's capability for uninterrupted supply by withstanding, and recovery from, disturbances arising from equipment failure, fuel supply shortages, operational planning issues, human error or deliberate, malicious attacks.

Energy insecurity occurs when there is a deficit, where the amount of energy consumed is greater than the amount of energy produced. Energy insecurity can be created by geography, lack of wealth, over-dependence on other countries, stretched supply routes and poor management.

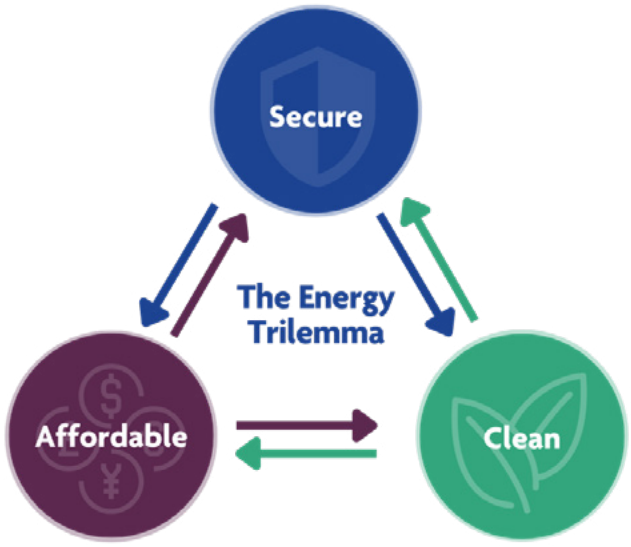
Whilst short-term energy security focuses on the ability of a country's energy system to react promptly to sudden changes in the supply-demand balance, long-term energy security is more aligned with economic developments and environmental needs. As the power sector pivots to decarbonise with the rapid growth in renewable sources and increased digitalisation governments, industries, and other stakeholders are improving their frameworks for ensuring electricity security through updated policies, regulations, and market designs.

Electricity's share of final energy consumption is set to grow to replace fossil fuel sources. Its contribution to global energy has increased from 15% to 20% over the past twenty years and will rise to around a quarter by 2040. Electricity underpins the activities of the residential, commercial, and industrial sectors. As electricity drives increased shares of heating, cooling, transport and digital sectors of communication, finance, healthcare etc., there is a need for increased resilience and security of sources.

Affordability

It is a national government's responsibility to ensure that its entire population can access and afford energy. Much of energy policy becomes centred around affordability due to political incentives and is the reason why many energy markets and utilities are forced into competition; to maintain fair prices for the public. However, this position is complex because energy has traditionally been a major source of tax revenue to many national economies, helping to fund national socio-economic infrastructure.

Some energy sources have a cost directly linked to rate of consumption. Others might have high initial capex costs but then their marginal cost of energy produced might be low and almost at no added costs for extra energy created. Zero net energy schemes may be affordable on the grounds that have no net energy demand external to their system. Energy prices have been rising around the world as supplies are tight as industries resume activities after Covid lockdowns resume operations, and as a knock on to events in eastern Europe.



Environmental Sustainability

With the recognition that greenhouse gas emissions drive climate change and are harmful for the planet, there is an urgency to wean ourselves off our high-carbon fossil fuel dependency. Since oil, gas and coal currently contribute over 80% of the world's energy needs, the task to convert to Clean Energy is huge and will not happen overnight. Whilst the low-carbon energy sources, vectors and wind and solar power, biofuels, blue and green hydrogen, carbon capture, use and storage (CCUS) technologies needed to achieve the decarbonization all exist today, the challenge is to deploy them at scale, an appropriate pace and at a cost that does not impose fuel poverty on communities.

Given there is still a need for oil and gas for decades to come, albeit it at a much-reduced level, it is crucial for the industry to decarbonise through electrification, use of geothermal technologies and reduce the carbon footprint by indigenous production rather than imports.

Key Themes

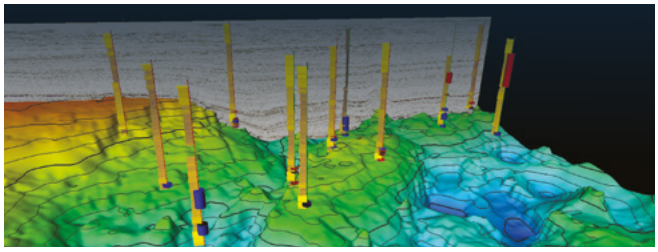
The CET seeks to accelerate the Energy Transition – fast tracking the optimal technical placement and integration of new technologies to extend the life and maximise the value of basins as energy hubs, whilst ensuring the transition is appropriate and just. Our research faces several key areas including the following themes:

Critical technical evaluation

The forensic geological assessment of proposed offshore and onshore sites through subsurface and sea-bed characterisation to determine the validity and ranking of sites for subsurface storage (e.g. carbon dioxide, hydrogen, compressed air and gas storage) and alternative energy sources (e.g. offshore fixed and floating wind, geothermal, solar etc.) to provide options and choice to deliver a low-carbon energy transition.

Spatial planning and engineering of energy systems

Undertaking the analysis of sites to determine which low-carbon renewable technology has primacy when co-location and spatial planning issues emerge; system integration connecting offshore fixed and floating wind farms to the grid; assessment of legacy well integrity; use of simulators for smart basin, wellbore technologies, decommissioning, offshore monitoring and remote inspection of hazardous environments.



Regulation and Economics

To evaluate the cost-benefit of low carbon renewable technologies and ensure the legal, regulatory, commercial, business and economic frameworks are in place to safeguard the environment yet deliver net zero.

Sustainable and Just Transition

To ensure that the energy transition is compatible with sustainability goals and underpinned by the relevant skills, training, and jobs to enable a Just Transition to be delivered that does not leave people behind and provides a pathway for countries and their communities.

Energy Transition Capital of Europe

Aberdeen is internationally recognised as a global energy hub, with over 40 years' experience as a centre for excellence in offshore energy exploration and production. Today, the city and the surrounding region is leading the way in applying its world-class technical and commercial expertise to the energy transition challenge.

The energy transition is visible across the entire northeast region, with multiple large-scale energy transition infrastructure projects already up and running. Equinor selected the Aberdeenshire coast as the location for Hywind, the world's first floating wind farm. Vattenfall meanwhile chose Aberdeen as the location of the European Offshore Wind Deployment Centre, Scotland's largest offshore wind test and demonstration facility. Aberdeen's pioneering Hydrogen Bus Project has created Europe's largest hydrogen-powered bus fleet, while the city's flagship events complex is powered by Europe's largest hydrogen fuel cell. Recently, the Acorn carbon storage project was approved as a Track 2 cluster.

The Energy Transition Zone – part of the £350 million Aberdeen Harbour expansion – will act as a focal point for applying the tremendous R&D expertise built up over the last 40 years to fast track the development and deployment of wind, tidal, hydrogen, geothermal, and carbon capture storage technologies.

National Decommissioning Centre

The National Decommissioning Centre is a multi-million-pound partnership between the University of Aberdeen and the Net Zero Technology Centre (NZTC) that is working with industry partners in achieving cost reductions, extending field and asset life, and advancing new approaches to net zero decommissioning. Find out more ukndc.com

Working in Partnership

The Centre for Energy Transition (CET) draws upon, links and acts as the catalyst for the wide range of expertise that exists in all of the Schools across the University of Aberdeen and plays a key role in delivering on the University's commitments to sustainability, as outlined in our Aberdeen 2040 strategy. The CET also contributes to and has direct links with a range of other organisations and centres of excellence including:

- The National Energy Skills Accelerator (NESA): https://the-nesa.org
- The GeoNetZero Centre for Doctoral Training (CDT) https://geo-net-zero.hw.ac.uk
- The Energy Transition Zone (ETZ) Ltd https://etzltd.com/

Education, Skills and Training

The University offers a wide and diverse range of programmes that face the Energy Transition. Their quality has been recognised through the award of numerous scholarships from industry partners.

Masters Programmes

Advanced Chemical Engineering, MSc
Advanced Mechanical Engineering, MSc
Advanced Structural Engineering, MSc
Artificial Intelligence, MSc
Chemistry for Sustainable Energy, MSc
Data Science, MSc
Decommissioning, MSc
Energy and Environmental Law (with Dissertation or Professional Skills), LLM
Energy Economics and Finance, MScECON
Energy Law (with Dissertation or Professional Skills), LLM
Energy Management, MBA
Energy Politics and Law, MSc
Energy Transition Systems and Technologies, MSc
Energy, Economics and Law, LLM/MSc
Environmental Management, MSc
Environmental Science, MSc
Geographical Information Systems, MSc
Geophysics, MSc
Integrated Petroleum Geoscience, MSc
Natural Resources Law, LLM
Offshore Engineering, MSc
Oil and Gas Engineering, MSc
Oil and Gas Enterprise Management, MSc
Oil and Gas Law (with Dissertation or Professional Skills), LLM
Petroleum Data Management, MSc
Petroleum Engineering, MSc
Petroleum, Energy Economics and Finance, MScECON
Process Safety, MSc
Project Management, MSc
Renewable Energy Engineering, MSc
Rural Surveying & Rural Property Management, MLE
Safety and Reliability Engineering, MSc
Subsea Engineering, MSc
Sustainability Transitions, MSc
Sustainable Energy Geoscience, MSc

For information about sholarships and other funding opportunities, please see abdn.ac.uk/energy/scholarships

On-demand Learning

By studying for an online qualification at the University of Aberdeen, you will have all the practical advantages of fitting your learning around your location, work and personal commitments. Our online programmes are taught by the same outstanding academics as our on-campus programmes – the only difference is the flexible mode of delivery.

Short Courses

In addition to our fully online Master's degree programmes, you can also choose to study a wide range of energy-related short courses online.

With part-time Master's level short courses, you learn without having to take time off work or commit to the cost of a full degree.

For the most part, course hours aren't fixed, so you can set your own study hours, while some courses are 'always-on', so you can enrol and study whenever you like, 24/7. You can build qualifications, including Master's degrees, one short course at a time.

Our energy-related online short courses include:

- Co-operative Contracts in the Oil and Gas Industry
- Data Science: From Data to Insight
- Decommissioning of Offshore Installations: Commercial Aspects
- Decommissioning of Offshore Installations: Regulatory Aspects
- Electrical Systems for Renewable Energy
- Energy Conversion and Storage
- Energy from Biomass
- Geothermal and Hydro Energy
- Governance and Petroleum Developments
- Introduction to Offshore Decommissioning
- Legislation, Economics and Safety
- Marine and Wind Energy
- Offshore Structures and Subsea Systems
- Petroleum Law: Resource Management
- Pipelines and Soil Mechanics
- Process Shutdown, Structural
- Decommissioning and Disposal
- Regulatory Law for Petroleum Operations
- Renewable Energy Integration to Grid
- Risk Allocation in Oilfield Service Contracts
- Safety and Risk Management
- Solar Energy
- Subsea Integrity

Find out more on.abdn.ac.uk

Continuing Professional Development

The energy sector is ever-evolving, providing organisations with challenges around their key asset – their people. We provide workshops, conferences, short courses, e-learning programmes and tailored training, all focused on improving an individuals' knowledge and skills, providing an impact for employers. If you are interested in developing tailored training contact: cpdservices@abdn.ac.uk.

Find out more abdn.ac.uk/business-info/training/

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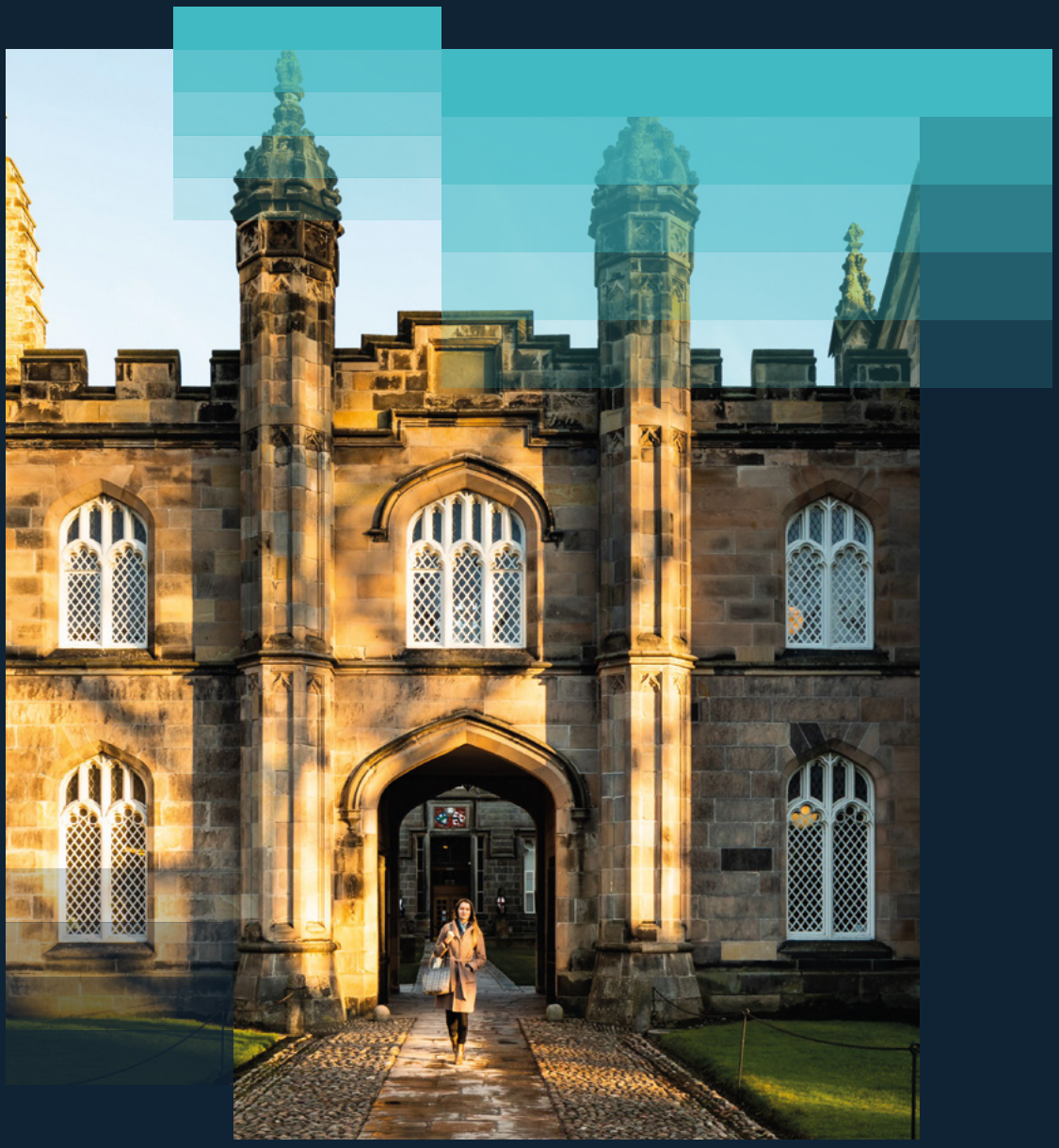

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