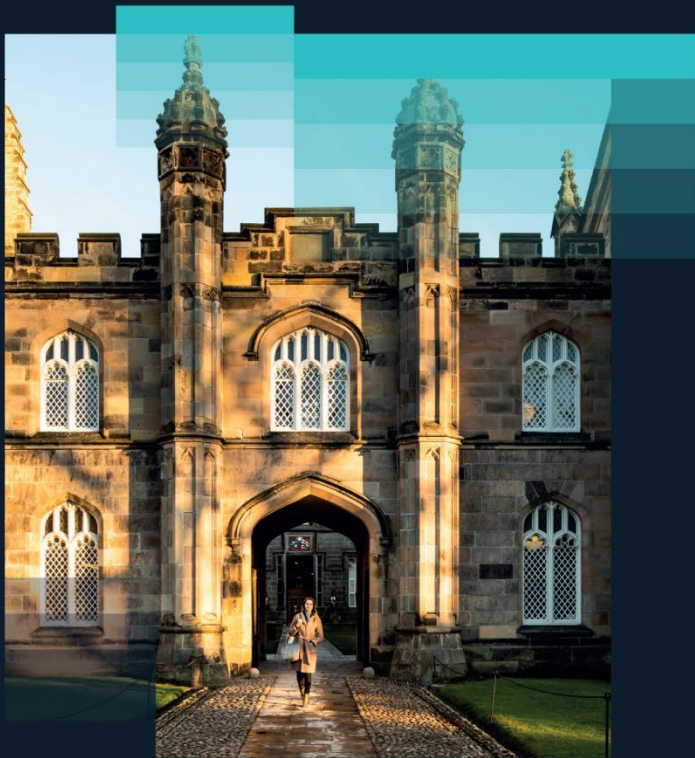




Scotland Beyond Net Zero 30/9/25

Aberdeen University: Supporting the Energy Transition: Research, Innovation & Skills

Professor John Underhill
Director for Energy Transition
University Interdisciplinary Institute

Chair of the National Energy Skills
Accelerator (NESA)

The Interdisciplinary Institute



5 interlocking global challenge areas

The whole is greater than the sum of the parts

Education beyond boundaries

**The Interdisciplinary
Institute draws upon the
expertise in and across
12 Schools**

Global challenges demand new ways of thinking.

Our education is informed by active research and delivered in an interdisciplinary and collaborative way:

- Biological Science
- Business School
- Divinity, History, Philosophy and Art History
- Education
- Engineering
- Geosciences
- Language, Literature, Music and Visual Culture
- Law
- Medicine, Medical Sciences and Nutrition
- Natural and Computing Sciences
- Psychology
- Social Science

GO BEYOND BOUNDARIES

£4M University Investment



Prof Georgios Leontidis



Prof Rachel Shanks



Prof David Burslem



Prof John Underhill



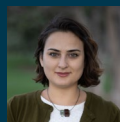
Prof Lesley Anderson



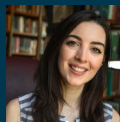
Milan
Markovic
NCS



Will
Harcourt
Geo



Nour
Halabi
S. Science



Rebecca
Macklin
LLMVC



Isabelle
Gapp
DHPA



Roslyn
Henry
SBS



Michael
Stratigos
Geo



Catherine
Sheard
SBS



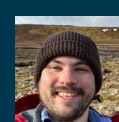
Kate
Gormley
SBS/Geo



Bartosz
Kurjanski
Geo



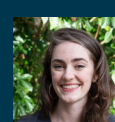
Scott
Doyle
NCS



Joe
Armstrong
Geo



Vivek
Bhatt
Law



Sabine
Parrish
S. Science

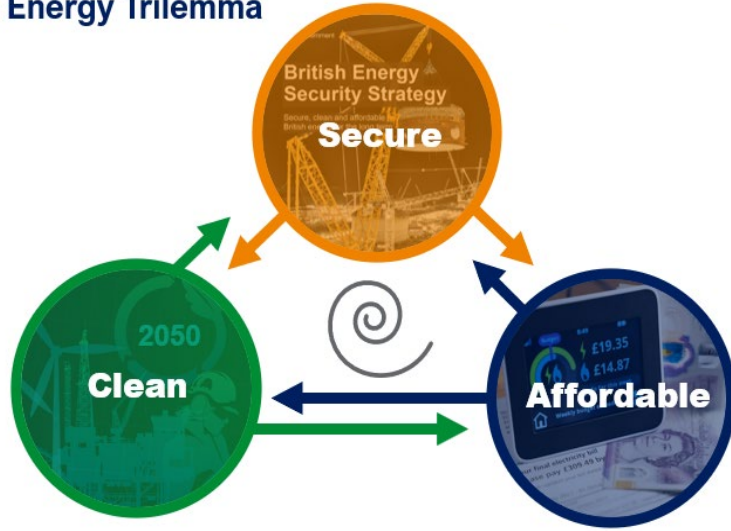


A cohort of 14 Interdisciplinary PhDs has now also been recruited

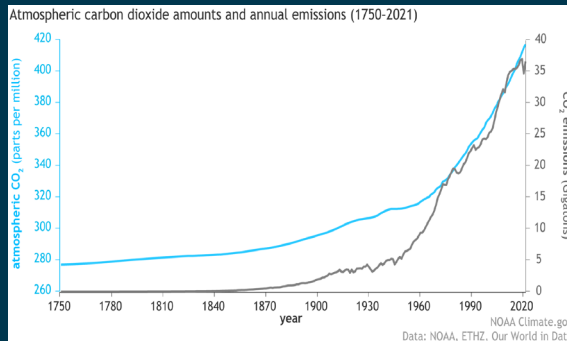
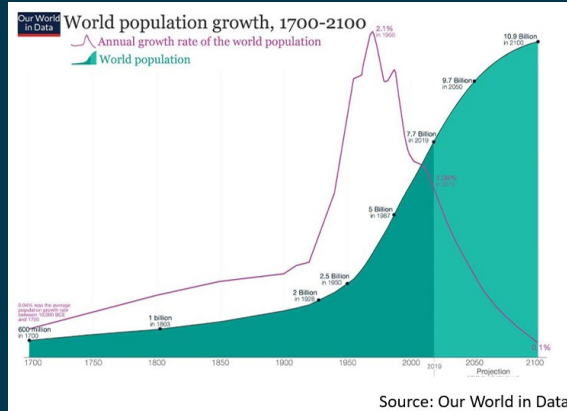
EST. → 1495

The Energy Trilemma: A key global, national and local challenge

The Energy Trilemma

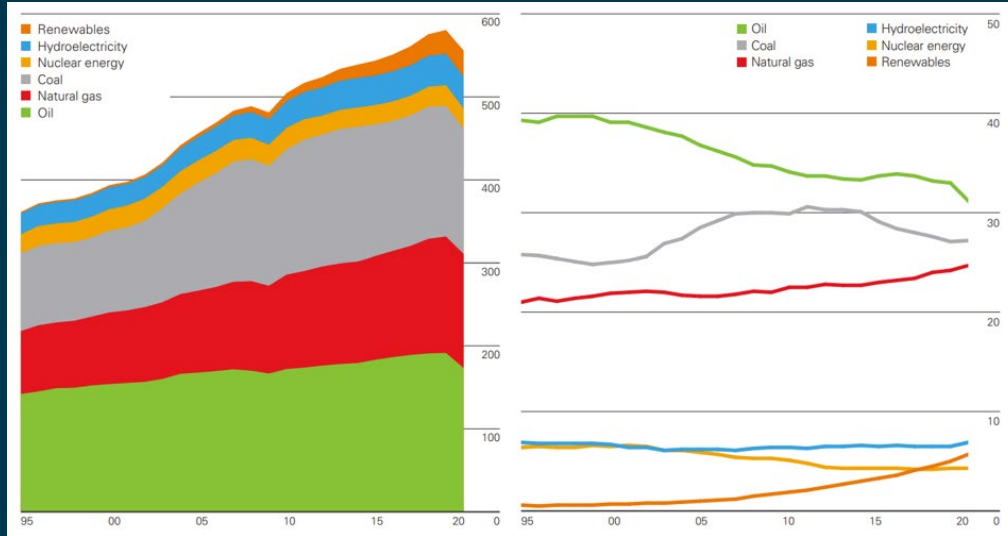


- Demands Interdisciplinary thinking to address the three pillars of the Energy Trilemma:
- **Energy Security & Reliability**
- **Affordability and Equitability**
- **Environmental Sustainability and Climate Compatibility**
- Potential low-carbon energy alternatives include offshore wind, hydrogen storage, nuclear, geothermal sources and carbon storage as a decarbonisation option;



Global Population

- 2.5 Billion just 70 years ago;
- Now over 3 times that number and is projected to rise to >10.5 Billion by the 2100;
- Puts enormous pressure on Earth Systems;
- How are we going to meet the resultant challenges?

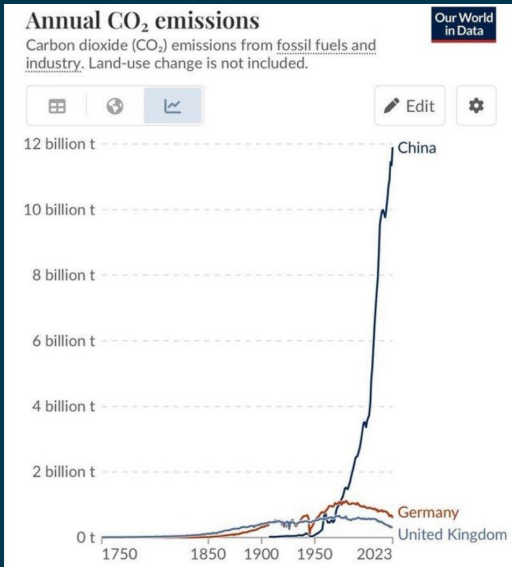
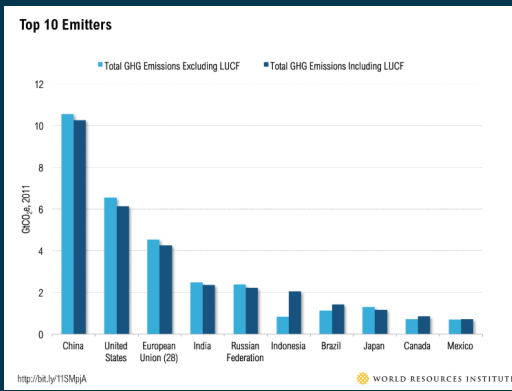


World Consumption
(Exajoules)

Share of Primary
Global Energy (%)

Energy Consumption

- World energy consumption continues to increase;
- Oil, Gas and Coal still account for **>80%** of global energy consumption;
- A challenging starting point on the pathway to net zero;

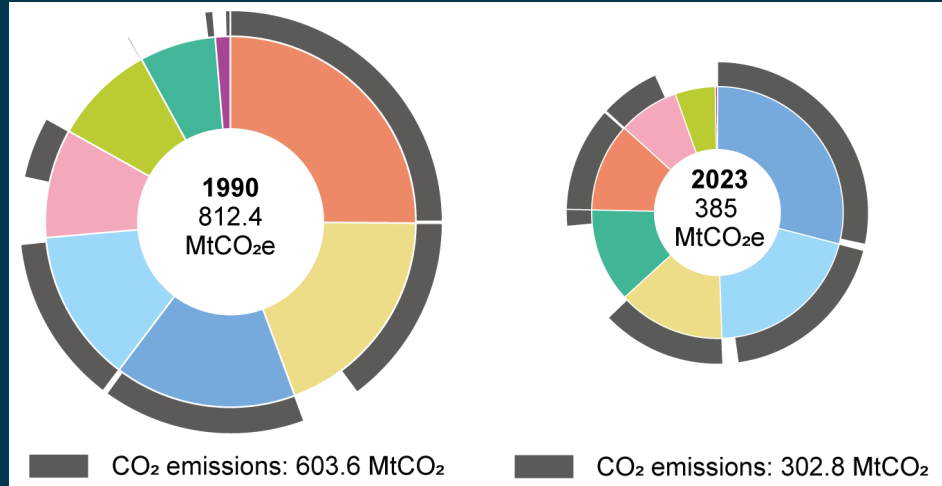


Global Emissions

- China, US, EU, India and Russia are the top five sources of global emissions;
- UK contributes <1% of Global Emissions (17th by country);
- UK has contributed 4.6% since the industrial revolution;
- Scotland's contribution a fraction of a percent;



UK Emissions

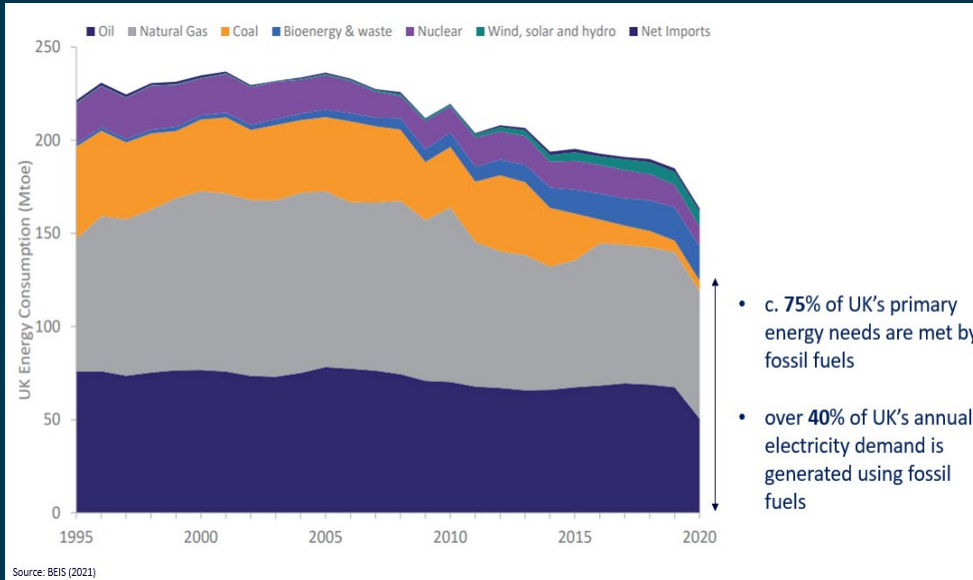


From Hamilton & Underhill

- UK Greenhouse Gas Emissions have reduced by >50% since 1990
- **Domestic Transport, Buildings and Product Use** have replaced Electricity Supply and Industry as the biggest source of emissions
- Decarbonisation of domestic transport and buildings and product uses requires increased use of renewables to achieve

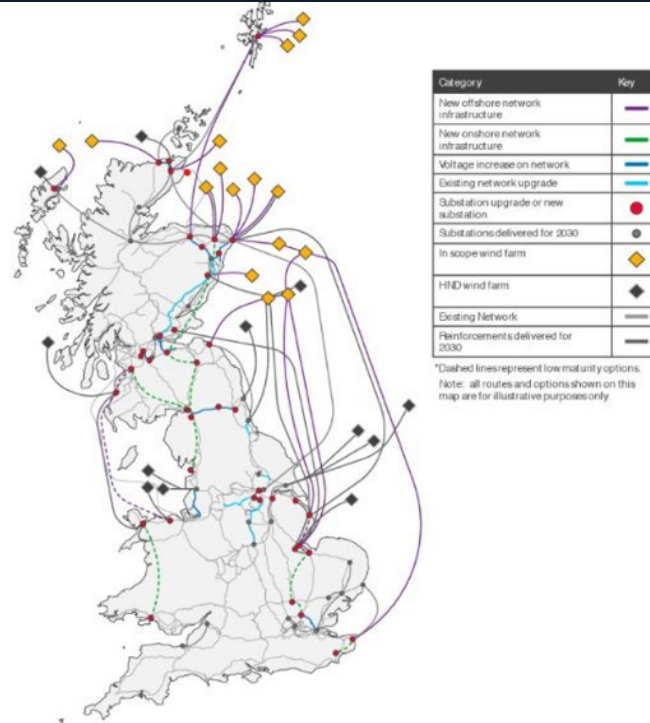
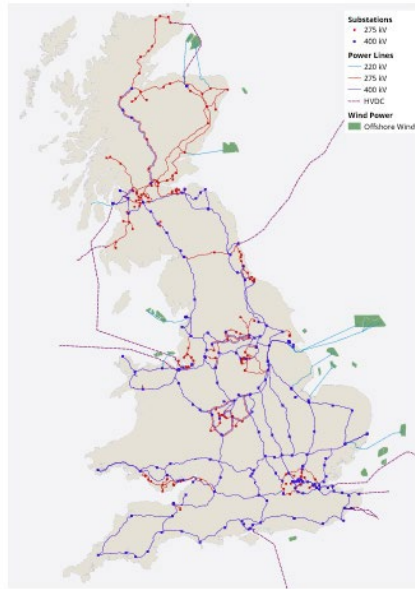


UK Energy Consumption



- UK has weaned itself off coal
- Oil and Gas still contributes 75% of energy consumption;
- Days when renewables have contributed 100%, but gas consumption still accounts for over half on cold, dark and windless winter nights;

From this to this...



Source: National Energy System Operator

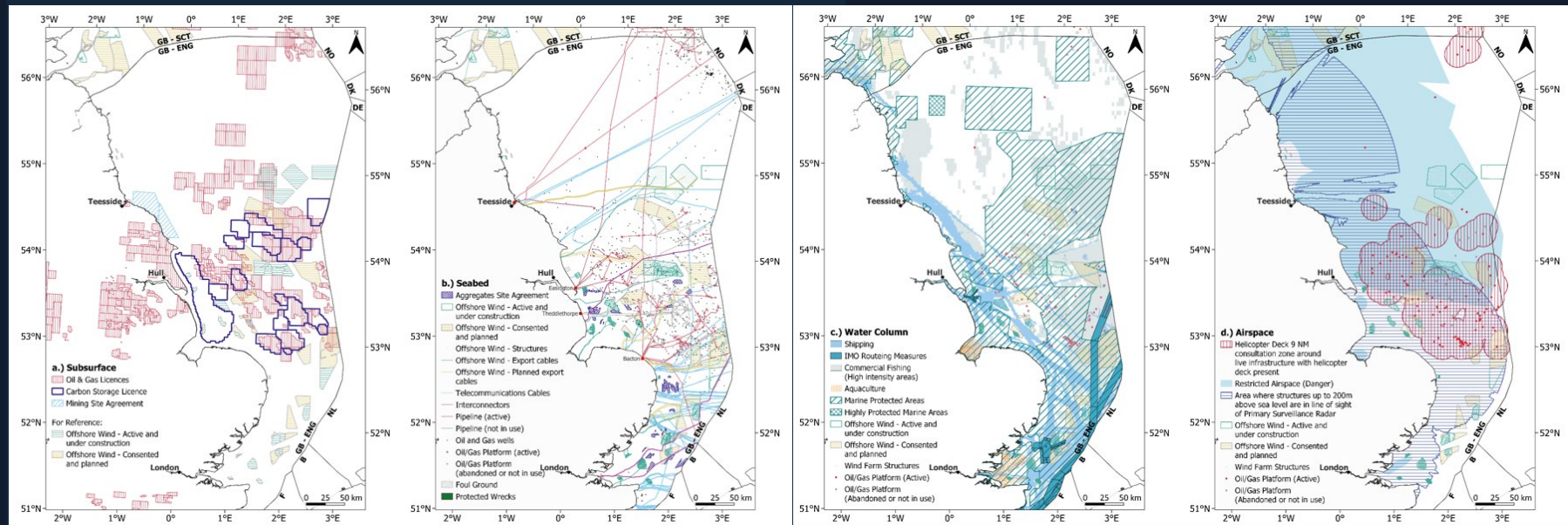
Rewiring Britain

The scale of the task
shouldn't be
underestimated

Communities need to
be part of the journey

The Spatial Squeeze

From Hamilton & Underhill



Subsurface

Sea Bed

Water Column

Airspace

78 GT of carbon storage/50 GW of wind energy



National Decommissioning Centre (NDC)

- Research and technology supporting sustainable decommissioning of oil and gas, nuclear and renewable assets
- Environmental assessment and long-term monitoring of structures
- Technology development including underwater laser cutting
- Scenarios for basinwide decision making



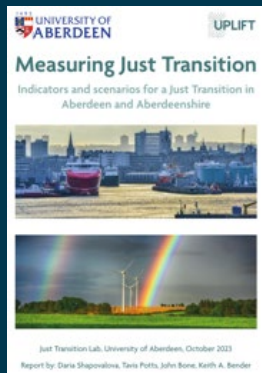
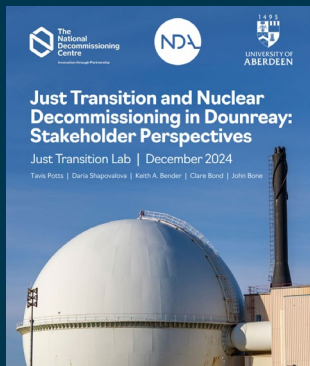
GO BEYOND BOUNDARIES



Just Transition Lab

Working at the forefront of Just Transition challenges, the lab uses participatory research to facilitate insightful policy analysis and engagement with key stakeholders.

- Portfolio of cutting-edge research including the £5.6 million UKRI JUST-Systems programme & the £2.4 million TRANSECTS project on marine transitions;
- Policy focused applied research e.g. Just Transition & Nuclear Decommissioning (2025) and Measuring Just Transition (2024);
- Engaged with government, civil society, business and communities on energy justice and a people-centred approach to Net Zero;





The CDT: Supplying the next generation of Geoscientists

CENTRE FOR DOCTORAL TRAINING

A global leader for postgraduate (PhD) research and training addressing the challenges, providing the solutions and supplying the pipeline of talent for the Energy Transition

GeoNetZero (GNZ): The Role of Geoscience in the Energy Transition and challenge to meet net zero emissions targets

Originally awarded in 2013, through a £3 Million grant from UK Research & Innovation (UKRI) in response to a competitive tender, the largest support for energy related postgraduate research and training from UK Research Council for decades;

The pan-UK Centre of Doctoral Training (CDT) subsequently attracted funding from academia, government and industry leading to it becoming a £17 Million PhD research and training initiative. The success of the original CDT model led to a subsequent award of £2.5 Million from NED Energy and launch of the GeoNetZero CDT successor in 2019, the only self-sustaining DTP or CDT;

Match PhD funding from the academic partnership of 12 Universities comprising Aberdeen, Birmingham, Dundee, Durham, Exeter (Cranborne), Heriot-Watt, Keele, Newcastle, Nottingham, Plymouth, Royal Holloway (RHUL) and Strathclyde University;

Over 170 PhDs have enrolled on the program over the past decade. All of the students participate in a 100-days 20-weeks that is supported by industry.



108 PhDs have completed their PhDs, all of whom have been employed in a relevant discipline thus demonstrating the quality of the students, value of the training and relevance of the CDT for industry at a time when recruitment and retention is challenged.

The CDT is an important component of the North Sea Transition Deal (NSTD), the only academic initiative therein.

Collaboration & Partnership

- Led a successful **pan-UK academic-industry Centre for Doctoral Training (CDT)** partnership entitled **GeoNetZero**;
- Turned a £3M NERC Investment in 30 PhDs into a £22M one supporting 178 PhDs;
- 12 Universities – 5 of whom are in Scotland
- 130 Graduates so far – all of whom have secured employment in a relevant discipline;
- New **NERC DFA entitled NetGAIN: Developing the science and practice of nature markets for a net positive future** with St Andrews



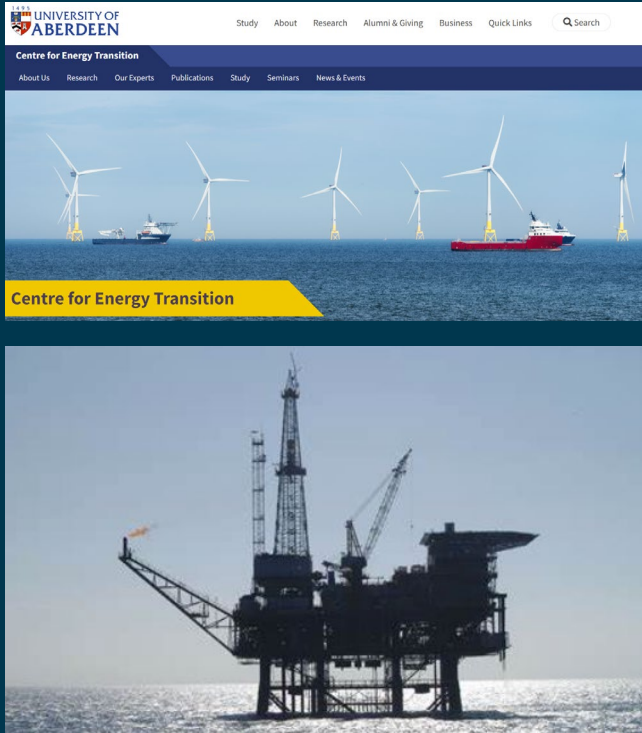
National Energy Skills Accelerator (NESA)

- Ensuring the right skills and training provision for the future energy workforce
- Partnership with two academic partners: RGU and NESColl, SDS and ETZ Ltd.;
- **£1M from Scottish Government Just Transition Fund** for pilot energy transition skills project supported >700 free places.
- **SFC NE Regional Pathfinder Project** on Learner Pathways
- Scottish Renewables Supply Chain Green Energy Award Winner 2025





Energy Transition



- The Energy Transition is one of the key societal challenges, with global, national & local implications;
- Decarbonise and reduce emissions at a pace that ensures security of energy supply and alleviates fuel poverty;
- The move away from fossil fuel dependence is a transition and not a cliff edge and there remains a role for oil and gas in the interim;
- Given Aberdeen's place as the UK's oil capital, a lot of jobs and services depend on the sector meaning there must also be a focus on people during the transition;

International Recognition: Times Higher Education Ranking



Interdisciplinary
Institute



Interdisciplinary
Institute

1ST IN SCOTLAND

THE Interdisciplinary Science Rankings 2025

2ND IN THE UK

THE Interdisciplinary Science Rankings 2025

TOP 10% WORLDWIDE

THE Interdisciplinary Science Rankings 2025

To find out more...

The screenshot displays the University of Aberdeen's research website. At the top, the university's crest and name are on the left, and navigation links for Study, About, Research, Alumni & Giving, Business, and Quick Links are on the right. A search bar is also present. Below the main navigation, a dark blue banner highlights the 'Research' section, with sub-links for Explore our Research, Impact, Institutes and Centres, Facilities, Support, Jobs, REF 2021, and Digital Research. The breadcrumb trail reads: University Home / Research / Explore our Research / Energy Transition. The main content area features a large image of an offshore wind turbine. Overlaid on this is a grey box with the text 'INTERDISCIPLINARY RESEARCH CHALLENGE' in yellow, followed by 'Energy Transition' in white. Below this, it says 'Bringing together Energy Transition research from across the University'. Two blue buttons are visible: 'Download our Brochure' and 'CET at SPE Offshore Europe'.

1495 UNIVERSITY OF ABERDEEN

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Research

Explore our Research Impact Institutes and Centres Facilities Support Jobs REF 2021 Digital Research

University Home / Research / Explore our Research / Energy Transition

INTERDISCIPLINARY RESEARCH CHALLENGE

Energy Transition

Bringing together Energy Transition research from across the University

Download our Brochure CET at SPE Offshore Europe