



Annual Review
April 2021 - March 2022

SPARKING THE TRANSITION

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The Net Zero Technology Centre has a vital role to play in supporting emerging technology companies and in developing disruptive technologies to enable the energy transition.

The Centre celebrating its fifth-year anniversary allowed us to pause and reflect on the significant achievements since its inception. It has surpassed delivery expectation screening over 1,450 technologies and commercialising more than 30 technologies. Such a milestone also gives us the opportunity to look forward to an exciting future, which is being shaped by the need for increased pace to create a net zero North Sea and secure a domestic renewable and clean energy supply.

The Centre's programme during COP26 was a fantastic opportunity to hear from research organisations from around the world on how they are addressing the common challenge of delivering net zero energy. We also heard from start-ups who are blazing a trail to develop the next generation of clean technologies. I was extremely impressed by the breadth of technologies showcased that are filling the technology gaps and the level of shared purpose – if this is a flavour of the innovation coming through, then

we are in a great position to deliver our net zero ambitions together. These businesses and ideas need support and investment to grow and commercialise, something we can offer through the NZTC.

There have been a number of changes to the board over the last year, and I would like to thank all the board members for their time, dedication and expertise, and welcome Dr Alexander Reip and Karin Hagemann to the board. These appointments strengthen our board's skill base bringing multi sector and entrepreneurial experience in addition to a focus on organisational sustainability.

Transitioning an industry and a nation to net zero is tough. I look forward to the coming 12 months and witnessing projects - which secured funding this year from the Scottish Government's energy transition fund - come to life and help establish Scotland's clean energy economy. I know that the NZTC will also continue to work closely with industry and partners to develop their plans for delivering net zero to support more ground-breaking innovation and start-ups that push the boundaries to move Scotland and the UK closer to its net zero goal.



Martin Gilbert
Chairman

01

A year in review



**Accelerating an affordable
transition to net zero through
game-changing innovations**

Over the last year, the pandemic has continued to affect nearly every aspect of life and business. As an organisation, we have learned and developed new ways of adapting to support each other and our partners, that have empowered us to produce a strong year of delivery under difficult conditions.

We have stayed focused on our core mission to develop and deploy technology that will drive an affordable transition to net zero. And 2021 saw our name change from OGTC to the Net Zero Technology Centre. It was the moment when we fully aligned with our true purpose, our investment strategy and our name raising awareness that the technologies we are accelerating are all net-zero oriented. Our national and industry net zero targets are approaching fast, there is a clear momentum to deliver a just transition to a new net zero energy world and we are determined to play our part.

Identifying, championing and delivering critical technology-led infrastructure generating projects is essential to the acceleration of the energy transition. In support of that aim, we were awarded £16.5 million funding from the Scottish Government's Energy Transition Fund to deliver our Net Zero Technology Transition Programme, which is expected to deliver £403 billion for the economy and over 21,000 jobs by 2050.

Our teams will deliver a significant programme of seven projects to help realise Scotland's net zero ambitions.

2021 saw Glasgow host COP26, heralding a hugely significant moment for the UK, bringing together 120 world leaders to accelerate action towards the goals of the Paris Agreement and the UN Framework Convention on Climate Change. Nations have been challenged to adapt to survive and evolve to thrive. We welcomed both physical and virtual attendees to the Net Zero Technology Centre's three-day fringe programme, 'The Road to Glasgow: Destination Net Zero', hosted live from Glasgow and broadcast globally. Our COP26 programme provided the vision and direction needed to close technology gaps and help define a clear path to an integrated energy net zero environment.

Our TechX Programme welcomed our fourth cohort this year, the first cohort to fully focus on clean energy, made up of more than 40% female led or co-led start-ups. Accenture came on board as a TechX Professional Partner and ADNOC joined our Strategic Partners bp and Equinor, reinforcing the continued commitment from industry to collaborate and support the growth of clean tech companies.

February 2022 also marked our fifth anniversary, an opportunity to take a moment to reflect on everything we have achieved in partnership with industry, government and academia and look forward to what is still to come.



Colette Cohen OBE
CEO, Net Zero Technology Centre

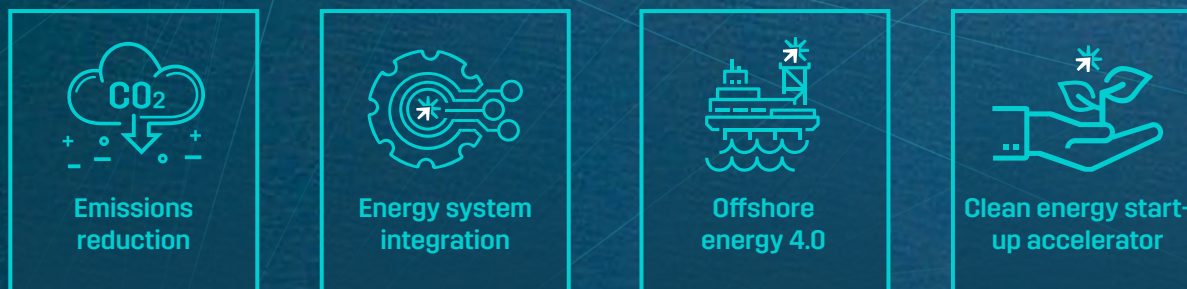
An aerial photograph showing a winding asphalt road with a red dirt shoulder, curving through a dense green forest. To the right of the road is a calm, dark blue lake. The text 'Five years at the forefront of developing and deploying technology' is overlaid on the left side of the image, with the words 'forefront', 'developing', and 'deploying' highlighted in green.

Five years at the forefront of developing and deploying technology

Our world is facing a hugely difficult environment with three common challenges: reducing our carbon emissions to net zero, continuing to meet our energy needs and making the transition affordable. As industries transition, we must ensure resilient and affordable energy supplies. For the oil and gas sector and other hard to decarbonise industries to support the UK's net zero target, innovation is key.

We have worked with our partners on these challenges, seizing the opportunity to inspire creativity, drive innovation, and secure the support needed to deliver sustainable energy long term.

Our four programmes are accelerating the transition to deliver a reimagined North Sea:

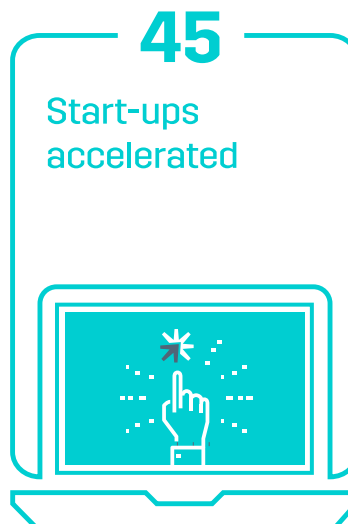
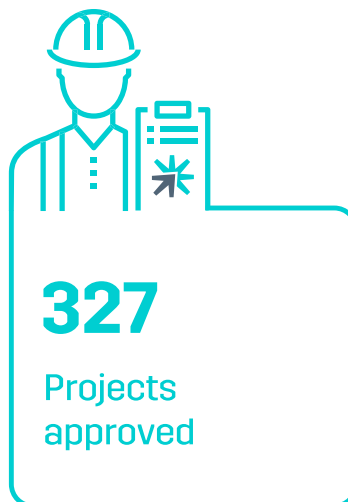
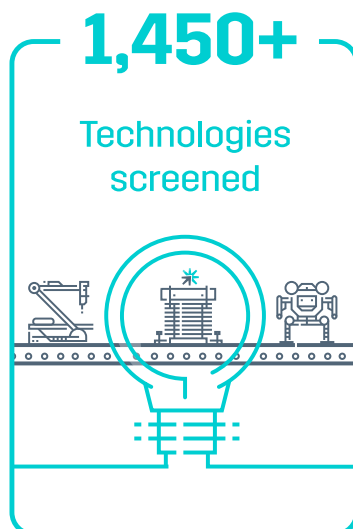


This year we celebrated a significant milestone, our five-year birthday. Five years of working cross-sector and internationally to tackle the most complex and most critical technology challenges; commercialising game-changing innovations, helping developers secure field trials, and accelerating those tech start-ups with the most promising clean energy solutions.

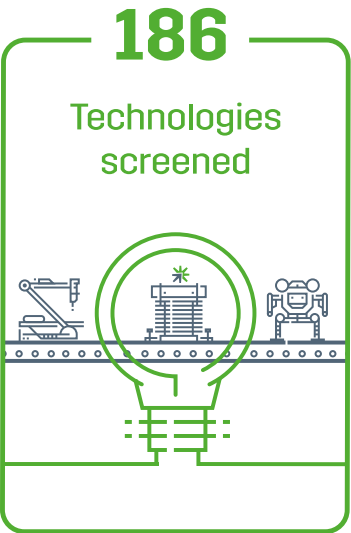
Five years of co-investing with industry and working in partnership with the public and private sectors, we continue to fund R&D, drive investment, build a clean energy eco-system and influence policy to accelerate the transition and close the gap on net zero technologies.

Supporting the oil and gas industry to diversify, decarbonise and digitise, we are well on our way to developing the next generation of technology solutions. Solutions that address real-world challenges across a range of sectors from renewables to manufacturing and accelerate our integrated energy future.

Since inception



A year of strong delivery (April 2021 – March 2022)



The technologies we've supported in developing and deploying this year are already making an impact; reducing oil and gas operational emissions, creating an integrated offshore energy system and enabling remotely controlled operations, empowered by data, robotics and autonomous systems.

Kibosh

Kibosh has successfully trialled their Rapid Repair technology that stops loss of containment, with a number of oil and gas partners including TotalEnergies, Harbour Energy, CNOOC International and Hydratight. Future trials will be undertaken to validate the Kibosh Rapid Repair High Efficiency Pipe Freezing clamp system.

Successfully trialled their Rapid Repair technology

Unity

A lightweight additive manufactured (AM) gate which enhances the sealing ability of a valve for depleted wells, design features significantly reduce the final weight, increasing the ability to seal in low pressure applications and therefore extend the production life of the well.

Extend the production life of the well

Aubin

Xclude, a novel approach to mitigate greenhouse gas emissions from oil and gas wells. Xclude uses a chemical reaction to create calcium sulphate mineral scale in the near well bore formation, blocking pore threats and significantly reducing permeability. Removes the need for columns of cement to be used, saving cement costs and rig time.

Saves cement costs and rig time

“We are supporting and accelerating technologies that actively drive clean energy innovation to deliver the UK’s 2050 emission reduction targets.”

Myrtle Dawes, Solution Centre Director, NZTC

Oceaneering

Focused Stress Concentration Tomography enables and supports the reduction of fugitive emissions by up to 60% and lowers maintenance costs by 40 – 60% through the detection of corrosion under insulation.

Up to **60%**
reduction of fugitive
emissions

NOV

A modular liquid storage solution that allows hydrogen (in the form of ammonia), chemicals or oil, to be stored at ambient pressure at any water depth, in remote subsea locations. The project will develop, build, test and verify large scale prototype systems. A verified system will assist in the decarbonisation of offshore power generation.

**A verified system will assist
in the decarbonisation of
offshore power generation**

Chevron ANYmal

The University of Oxford and the University of Edinburgh (via the ORCA Hub) partnered with Chevron to deploy and validate new navigation and mapping technology, at a live operational petrochemical plant in Ghent, Belgium. The software, deployed through a quadruped robot, ANYmal, completed a series of relevant navigation and visual inspection tasks proposed by Chevron. This live, operational trial was the first for Chevron across its assets, globally.

**Multiple quadrupeds,
including ANYmal deployed
on a live petrochemical plant**



ANYmal robots



Hydromea's Exray wireless underwater ROV system

Hydromea

Gen1 EXRAY, Hydromea's tetherless underwater ROV system has been successfully deployed within a full ballast water tank on one of TotalEnergies' North Sea FPSO vessels. During this interim trial, EXRAY successfully collected visual inspection data, validated system performance including autonomous operation, bringing a paradigm shift in how submerged assets are inspected and monitored. Final trials with Gen2 EXRAY will conclude in Q3 2022.

A paradigm shift in how submerged assets are inspected and monitored

Waterwhelm

A patent-pending forward osmosis technology powered by waste-heat that utilises natural osmotic pressure to draw water across a semi-permeable membrane. Waterwhelm's technology can be utilised to reduce the electricity consumption of desalination by up to 80%.

Up to 80%
reduction of electricity
consumption of desalination

QL Tech

A next generation AI system, encompassing the latest developments in machine vision and machine learning to automate fabric maintenance blasting and painting. The project has built, tested and qualified an autonomous robot in a controlled environment onshore which demonstrates the ability to blast and coat uniform surfaces on a tank and series of pipes. Further work on reliability and autonomous capabilities is being undertaken in preparation for a potential phase 2 of the project which would involve offshore field trials.

**Next generation
AI system**

SMART-DAC sytem



Girling McIntosh

Well risk modeller, Empirica, tells operators when wells must be shut in or otherwise made safe, avoiding needless production loss from well risk over-estimation. Empirica is expected to safeguard at least \$50 million worth of production annually for project partner Total Energies, while reducing the probability of process safety incidents from wells.

>\$50 million
of annual production
safeguard

Supercritical

A TechX Pioneer, Supercritical is developing the world's first high pressure, ultra-efficient electrolyser, for the production of hydrogen and oxygen from water, with zero emissions. It exploits the benefits of supercritical water and delivers gases at over 200 bar of pressure, without the expense or challenges of hydrogen compressors.

>200 bar
of pressure

CO₂ Circulair

The SMART-DAC system captures CO₂ from the air, creating a continuous absorption/regeneration cycle. The scalability and sustainability of the SMART-DAC system makes it an affordable solution to small, medium, and large-scale capture of CO₂.

**Affordable solution
to capture CO₂**

Supercritical's ultra-efficient
electrolyser schematic



Enabling Scotland to become a global leader in net zero technology

£16.5m funding awarded

£403bn for economy

21,000 jobs by 2050

Net Zero Technology Transition Programme

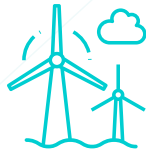
At the heart of what we do is a focus on turning the net zero ambition into reality, made even more possible following the award of £16.5 million from Scottish Government's Energy Transition Fund in August 2021.

The funding, which will be match funded by industry, is driving seven projects through our Net Zero Technology Transition Programme (NZTTP) which is expected to deliver £403 billion to the economy and 21,000 jobs by 2050.

"The Energy Transition Fund is helping the energy sector to grow and diversify and accelerate the journey to net zero, and underpin the north-east's ambitions to become a world leader in this transition."

**Michael Matheson, Cabinet Secretary
for Net Zero, Energy and Transport**

Seven projects funded by Scottish Government's Energy Transition Fund set to accelerate the transition



1. Energy Hub

Combine operation, production, storage and transport, cornerstones of an integrated energy system and essential elements for the transition to net zero. The hubs will produce clean energy by connecting renewable energy sources such as wind, tidal and hydrogen, which will require CO₂ emissions to be captured and managed successfully.



2. Hydrogen Backbone Link

Unlocking Scotland's hydrogen export potential by developing pan-European infrastructure, including repurposing existing pipelines.



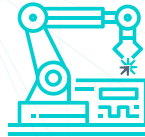
3. Alternative Fuel Gas Turbines

Developing a low carbon alternative to natural gas will help decarbonise offshore and onshore operations without extensive modifications. In addition to the significant export opportunity in the oil and gas sector, gas turbines have numerous applications in onshore industrial processes and electricity production.



4. Offshore Low Touch Energy Robotics and Autonomous Systems (OLTER)

Building a best-in-class offshore industrial RAS (Robots and Autonomous System) centre in Scotland, positioning the country as an international leader in deploying robotic and automation technologies.



5. Offshore Manning Optimisation (OMO)

Enable industry to employ remote operations technology and optimise future working environments across the offshore energy sector.



6. Data for net zero (D4NZ)

A programme of research projects with data science, visualisation and computer modelling at its core. D4NZ will power forward a reimagined offshore energy system enabled by data sharing and evidence-based decision-making.



7. Offshore Energy Digital Architecture

Developing a sector-wide digital and data architecture to enable our future offshore energy system, improve data visibility and demonstrate that we can make critical industry data available in a manner which is as open and secure as possible.

Driving innovation forward



Net Zero R&D Programme

The projects within our Net Zero R&D Programme advance the understanding of early-stage fundamental science challenges to deliver a net zero energy transition and invest to accelerate the development of technology to solve them.



£1.7M

Cash Funding
Commitment



£2.5M

Matched Funding



18

Projects



85

Industry partners

Project themes



**Direct Air Carbon Capture
(DAC) & Direct Seawater
Carbon Capture (DSC)**



**Sustainable Subsea
Microgrids**



Hydrogen Innovation:

- Optimising the Production of Hydrogen
- Hydrogen Transportation
- Long-term Hydrogen Storage
- Hydrogen Carrier Utilisation



**CO₂ Injection & Storage in
UKCS depleting reservoirs**

Call for ideas - hydrogen technologies

In April 2021 we launched a call for ideas to help power the UKCS with hydrogen technologies. The focus was end-to-end hydrogen innovation, optimising the production of blue hydrogen, hydrogen transportation, long-term hydrogen storage, and hydrogen/hydrogen carrier utilisation.

33 ideas submitted

16 selected

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Our call for ideas identified some truly ground-breaking technologies that will deliver innovative hydrogen technologies for the UKCS to shape the future of the energy industry as we transition to net zero.

**Dr Vinay Mulgundmath,
Chief Technologist, NZTC**

The background features a circular diagram with a clock face. The numbers 1 through 10 are visible on the right side of the clock. On the left side, there are three segments labeled 'PIONEERS', 'MARKET ENTRY', and 'VENTURES' from bottom to top. At the bottom of the circle, there is a sine wave graph on a grid. The text 'Building a thriving ecosystem that propels economic growth while shaping the future of clean energy' is centered in the middle of the image.

**Building a thriving
ecosystem that propels
economic growth while
shaping the future of
clean energy**



230
applications



50
countries



12
technology
start-ups



40%
Female led or
co-led start-ups

TechX cohort four: Diverse and game changing startups

We're harnessing entrepreneurial spirit and unleashing the power of innovation and determination through TechX, our award-winning accelerator programme, which provides clean energy start-ups and early-stage businesses with the tools, support and resources they need to grow.

We've built on previous years' success with cohort four of our TechX Clean Energy Accelerator attracting over 230 applications, spanning 50 countries.

Following a pitch to a panel of industry experts, **12 highly innovative technology start-ups were selected.** Our commitment to diversity resulted in more than 40% being female led or co-led start-ups.

This year, ADNOC joined as a Strategic Partner alongside bp and Equinor, Accenture came in as our new TechX Professional Services Partner.

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Start-up companies are vital to introducing and commercialising the next generation of technology that will disrupt the current energy system and accelerate the transition to net zero.

Mark Anderson,
TechX Director, NZTC



Being a female co-founder and CEO makes diversity an intuitive second nature. Having previously experienced discrimination, I ensure that we at BeeX assemble the best team to solve challenging problems, independent of gender, nationality, and/or ethnicity. We see diversity as a strength, which can help us improve as an industry and society.

**Grace Chia, CEO and Co-founder
of BeeX Autonomous Systems**

The North East of Scotland was one of the first regions to deploy subsea vehicles offshore, but over the years that pioneering spirit has faded. Our aspiration is to help re-establish the region as the global leader in underwater robotics, whilst offering more sustainable ways of working subsea.

**Lee Wilson, CEO & Co-founder
of HonuWorx**

TechX cohort four start-ups set to disrupt

Aquature

Technology to produce green chemicals and carbon neutral fuels from wastewater, using a net energy-positive bio-electrochemical process.

Dunia Innovation

The world's first self-driving laboratory for electrocatalytic CO₂ utilisation, significantly speeding up catalyst discovery.

RepAir Carbon Capture

A modular, cheaper way of capturing carbon through an electrochemical system powered by electricity.

BeeX Autonomous Systems

Hovering autonomous marine systems, paired with a subscription-based software portal to conduct intelligent assessments and analyses of underwater assets.

HonuWorx

Uncrewed systems for the deployment and control of subsea robots that drive down the cost and emissions of offshore operations.

T-Omega Wind

Low-cost floating wind turbines for coastal community energy which can resist wave-induced motion and align to the wind by weathervaning.

Brayfoil Technologies

A novel wind turbine blade design that utilises bio-mimicry to improve performance and efficiency.

JET Engineering System Solutions

Floating telecom mesh networked 5G buoys that enable safe, secure and sustainable smart operations by combining data with communications.

UP Catalyst

A carbon-capturing reactor that can convert airborne CO₂ into graphite.

Cedeco

Technology offering a mechanical alternative to grout for offshore wind turbine jacket installation.

PJP Eye

Rechargeable plant-based dual carbon batteries that utilise industrial waste instead of rare metals, with potential applications in marine and aviation.

ZEM Fuel Systems

An ammonia-based fuel cell to power marine vehicles resulting in zero-carbon transportation.

Championing diversity and celebrating inclusion

Female-led businesses are more capital efficient with a return on investment 35% higher than male-led businesses (Forbes, 2019)

Our Clean Energy Accelerator facilitates an inclusive environment which thrives on diversity of thought and an integral part of this is increasing diversity. 47% of the shortlisted companies were female-led or co-led, a large increase on past cohorts.

Share of ethnic diversity also increased across the assessment cycle, with 42% of the final cohort.





4

**Ideas Club events,
inspiring female
entrepreneurship
and diverse teams**



**Inspiring the next
generation of female
founders in the clean
energy space**

Inspiring new thinking and growing game changing ideas

TechX Ideas Club was run from April to June 2021 offering the thriving community the platform to ignite their creativity, develop concepts, validate ideas, hear from inspirational speakers, network and launch new clean energy businesses.

The four virtual events, aimed at inspiring female entrepreneurship and diverse teams, included speakers from Skills Development Scotland, Skillfluence, Thorpe Molloy McCulloch, BeautyBooker and Rora Dairy. All shared their insights into their entrepreneurial experiences and how to successfully build confidence and creativity to drive their ideas towards success.

I was delighted to host a TechX Ideas Club workshop, which focused on generating new ideas and enhancing entrepreneurial thinking. The session was designed for budding female entrepreneurs to build confidence, boost creativity and establish new connections.

**Alison Gray,
Founder of Skillfluence**



Pioneers continue to push boundaries

TechX Pioneers from cohort one to three continue to develop their ideas, secure additional investment and achieve growth.



£28M INVESTMENT RAISED

TechX start-ups have raised £28m in investment since graduating from the accelerator programme to continue to accelerate their tech/business.



£70M IN EQUITY

As of March 2022, eight TechX Pioneers are raising equity and 13 are planning to start raising equity in the next 12 months, totalling £70m in equity raised or planned.



£5.5M IN REVENUES

TechX Pioneers generated an aggregate £5.5m in revenues in 2021.



206 EMPLOYEES

Pioneers provided work for 206 employees (including part-time) and contractors in 2021.



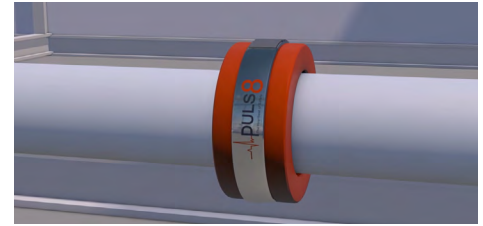
A graduate from cohort three, this London-based start-up is developing low-cost direct air capture (DAC) technology.

Founded in 2020 as a spin-out from Deep Science Ventures, a TechX partner, Mission Zero's technology will recover high-purity CO₂ from the air at a fraction of the cost and energy it takes to do so today. The company has been awarded up to €120,000 for DAC demonstration with Repsol in Spain and has secured a place in Stripe's carbon removal portfolio, with an award of up to \$1.5M. Mission Zero was featured in the Evening Standard's "Top London Tech Start-ups to watch in 2022".



Industry 4.0 start-up PipelineSentry is developing a cloud-based platform to create digital twins of pipelines.

Based in the Netherlands, and a participant in cohort three of the TechX accelerator in 2020, PipelineSentry won the TechX performance prize. Their technology, which uses machine learning to automate finite element analysis, digitises and links all pipeline design, manufacturing, operations and survey data sets. Pipeline operators can then automate their engineering assessments and make rapid data-driven maintenance decisions. The company has demonstrated its technology in several geographies, including a liquid natural gas plant in Australia.



Puls8's non-invasive technology identifies, and records data for, pipework, tubing, hoses and cable in complex environments to improve safety and increase efficiency.

Aberdeen-based start-up Puls8 won the bp ventures technology prize while participating in the TechX accelerator. Puls8's relationship with bp has continued with their acceptance onto bp's incubation programme. As well as removing the risks to personnel and plant, their digital solution reduces carbon emissions by increasing operational efficiency and eliminating misidentification incidents. The company has completed several field trials and, in January 2022, they commenced a project with NZTC and industrial partners to support further development and field trials of their tooling system.

COP26 marked a pivotal moment in the fight against climate change, and for the first time in history, the UN Climate Change Conference was held in the UK.

In the run up to COP26 we hosted a number of Insight60 webinars to spark conversations that explored the potential solutions to transform our industry and drive us towards a more successful sustainable economy. The series featured presentations from aviation, academia, finance and the energy industry.

During COP26 we welcomed both physical and virtual attendees to our three-day fringe programme, 'The Road to Glasgow: Destination Net Zero', hosted live from Glasgow and broadcast globally. Our three-day event opened with a keynote speech from Michael Matheson MSP, Cabinet Secretary, Net Zero Energy and Transport and also featured Malcolm Offord of Garvel, Parliamentary Under Secretary of State.

From exploring technologies that are set to disrupt and accelerate net zero, to crowning the start-up champion from our clean energy pitch battle, our COP26 programme provided the vision and direction needed to close technology gaps and help define a clear path to net zero.

3 days



105
in-person
attendees



680
virtual
attendees

Pitch battle



10
start-ups



1
winner - Mineral
Carbonation
International

Global Summit



10
presentations
by international
research
organisations

Technology showcase



10
game-changing
technologies
over 3 days

Global summit

Ten presentations by international research organisations compared regional technology priorities for accelerating industries towards net zero. This culminated in the announcement of an international research study which we will deliver alongside the research organisations who participated in our global summit. The results will be presented at COP27 in 2022.

Each international research organisation will contribute to the 'Technology Priorities for a Net Zero Integrated Energy System: a global perspective' study.

Working together, the research organisations will analyse key energy transition technologies across mature hydrocarbon basins, including blue and green hydrogen, offshore wind, oil and gas electrification, direct air capture and carbon capture, utilisation and storage. The study will identify technology gaps and innovation priorities to accelerate an integrated net zero energy future.

“

Climate change doesn't stop at borders, and neither should the effort to fight against it. That's why we are collaborating with several Technology Centres around the world to identify and address the technology innovation priorities required to fill the gaps in the journey to an affordable integrated net zero energy system.

Luca Corradi,
Innovation Network Director, NZTC

“

This initiative by the Net Zero Technology Centre to bring together research experts has been hugely worthwhile. Encouraging collaboration between countries to exchange valuable ideas is our best hope for securing a smooth, sustainable and economically beneficial transition away from fossil fuels.

Malcolm Offord,
UK Government Minister for Scotland

TNO innovation
for life

NERA NATIONAL
ENERGY RESOURCES
AUSTRALIA

 Research Centre for
Greenhouse Gas Innovation

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

**energy
research &
innovation**
NEWFOUNDLAND & LABRADOR



 Carbon
Hub

 InnoTech
ALBERTA
A SUBSIDIARY OF ALBERTA INNOVATES



Scottish Carbon Capture & Storage

SCCS **IDRIC**

Pitch Battle

TechX's Clean Energy Start-up Pitch Battle showcased 29 clean energy start-ups on our website which were subject to a public vote. The final ten companies were selected based on the global public vote and a judging panel consisting of sector experts.

The winning start-up was Mineral Carbonation International (MCi) from Australia.

MCi pitched their scalable carbon platform technology that safely converts industrial CO₂ emissions into solid bulk materials, which has the potential to help accelerate the transition to net zero. MCi received a package of tailored support from the TechX programme.



Pitch Battle Winner photo caption (from left to right): Martin Gilbert, Chair, NZTC (Chair of the Judging Panel), Colette Cohen OBE, CEO, NZTC, Sophia Wang, COO, Mineral Carbonation International and Mark Anderson, TechX Director, NZTC.



29

clean energy
start-ups



10

finalists



1

winner

“

During COP26, our Clean Energy Pitch Battle presented an exciting opportunity for investors, industry players and policy-makers to show support to new companies with fresh, game-changing ideas. Each participating company demonstrated a high degree of ingenuity, determination and ambition, highlighting the pivotal role start-ups can play in enabling clean and affordable energy.

Mark Anderson,
TechX Director, NZTC

“

Transforming emissions into useful materials for the circular economy can help us to decarbonise and create new global industries. Winning this battle will absolutely help us to scale and accelerate our plans to lock away 1 billion tonnes of CO₂ into useful materials by 2040.

Sophia Wang,
COO of MCI

Technology showcase

During our COP26 programme, we showcased over 10 game-changing technologies that address real-world challenges across a range of sectors from renewables to manufacturing and accelerate our integrated energy future.

10 game-changing technologies



Academic partnerships to tackle key industry specific challenges

National Subsea Centre (NSC)

3 strategic research programmes

14 ongoing research projects

16 strong academic groups
with 9 PhD students

The NSC, a partnership between Robert Gordon University and NZTC, is a multi-million-pound Centre of Excellence for Subsea Research Technology development.

The NSC's aim is to accelerate the energy transition through smart technologies applied to the entire eco-system which makes up the blue economy; industries including oil and gas, offshore renewable energy, tourism, marine aquaculture, carbon capture, maritime transport, defence, climate change, and waste management. The NSC is expected to be officially launched in September 2022.

It is currently focused on three programmes: Transparent Ocean, Integrated Marine Energy and Net Zero Marine Operations.





Simulating reality, transforming approaches

National Decommissioning Centre (NDC)

NDC is a partnership between NZTC, the University of Aberdeen and industry.

Building on the world-leading R&D capability at the University of Aberdeen, the NDC is transforming the approach to decommissioning, including infrastructure repurposing opportunities and leading crucial research to decarbonise decommissioning. Supporting the energy industry's transition to net zero.

In September 2021, the NDC opened its marine simulation suite. The £1.6 million suite has been funded by the Scottish Government, the UK Government and NZTC through the Aberdeen City Region Deal. It can undertake detailed marine technology and operational simulations as well as complex data modelling and visualisation.

These advanced capabilities provide a safe, virtual environment where users can simulate offshore and subsea operations in real time, such as the removal or installation of energy infrastructure, deploying a range of equipment and vessels to see which are best suited to the task and introducing challenging factors such as variable weather and tidal conditions.

“

The simulator has been an important addition to the National Decommissioning Centre and we are already working with industry to unpick complex offshore engineering challenges. We are also looking forward to supporting the Net Zero Technology Centre's Data for Net Zero project using the simulator's 'smart cities' capability to create a reimagined offshore energy system enabled by data sharing and evidence-based decision-making.

Prof. Richard Neilson,
National Decommissioning Centre Director

29 total projects

14 PHD

12 Postdoctoral research

3 Infrastructure projects



A partnership approach to accelerating the transition

We continue to nurture and grow our network of partnerships to share resources, capabilities and expertise to tackle the net zero challenge.

Cross sector collaboration provides a unique opportunity to learn from other industries to overcome difficult challenges, with so much to achieve to reach our 2050 net zero targets, now is the time to reach out beyond our usual boundaries and find new sources for innovation, empowerment, and support.

Our international collaboration brings an unparalleled breadth of knowledge and skillsets to projects, enabling us to leverage world-class expertise and talent to better understand and address the significant global themes emerging with regards to the energy transition.

Horizon Europe funded ConsenCUS

The ConsenCUS consortium, led by New Energy Coalition and University of Groningen, aims to make carbon capture and conversion possible with (green) electricity, so that it can be carried out more sustainably and potentially carbon neutral. The consortium has secured €12.6 million of European funds and private investments. NZTC will provide technical oversight and utilise its industry partnerships to conduct modelling studies of CO₂ capture to further bolster the research.

Ballylumford Power-to-X

NZTC has formed a consortium with B9 Energy, Mutual Energy and Islandmagee Energy Ltd to deliver phase one of the Power-to-X Project as part of the UK Government's Department of Business Energy & Industry Strategy (BEIS) Longer Duration Energy Storage (LODES) Demonstration innovation competition.

Phase one of the Power-to-X Project will see the delivery of a front-end engineering design (FEED) to demonstrate the concept of innovative, first-of-a-kind, longer duration (>= 4hrs) energy storage technologies which can be deployed at scale.

“

Driving forward energy storage technologies will be vital in our transition towards cheap, clean and secure renewable energy.

It will allow us to extract the full benefit from our home-grown renewable energy sources, drive down costs and end our reliance on volatile and expensive fossil fuels.

Greg Hands, Energy & Climate Change Minister

Energy Transition Alliance

We continue to collaborate with ORE Catapult and deliver against the jointly formed Energy Transition Alliance (ETA) to drive technology projects.

Five projects have been kicked off to support the North Sea's transition to renewables that include developing solutions for the recycling and re-purposing of wind turbine blades, supporting the growth of the floating wind foundation sector and improving opportunities for offshore energy supply chains.

Hydrogen Innovation Initiative (HII)

HII is a collaboration between six Catapult Centres, three Technology Centres and NPL creating a connected, end-to-end innovation ecosystem to convene industry, government and broader stakeholders. HII aims to accelerate innovation and develop growth in the UK hydrogen supply chain and overcome technology and integration challenges to establish an effective UK hydrogen economy.

“

Our Energy Transition Alliance partnership with NZTC is driving forward many strategically important innovations in areas such as sustainability, floating wind, robotics and supporting the growing UK supply chain, bringing cross-sector solutions to creating a more integrated energy future for the UK.

Andrew Jamieson, Chief Executive of ORE Catapult

A closer collaboration between North Sea countries is required to grasp the opportunities of system integration. In addition, the database of One North Sea provides a great overview of initiatives to maximise the benefits from collaboration and integration in the North Sea.

**René Peters, Business Director
Gas Technology at TNO**

TNO innovation
for life

SNZR (Scotland Net Zero Roadmap)

The SNZR project is part of a UK government funded challenge which boasts Innovate UK as its largest funder. The project aims to develop a roadmap that sets out how Scotland's industrial clusters can move towards Net Zero by 2045, based on exploring a set of decarbonisation scenarios.

Project partners are: Aker Solutions, Costain, Doosan Babcock, Energy System Catapult, Halliburton, Optimat, NZTC, Pale Blue Dot, University of Edinburgh, University of Strathclyde, and Wood Plc.

'One North Sea' flagship database

Cross-border collaboration, alignment and joint planning in the North Sea region is fundamental for a successful energy transition. Along with TNO, we launched 'One North Sea', a publicly available platform which maps out close to 90 integration projects already underway in the Netherlands, UK and Norway that demonstrate a component of re-use of existing infrastructure. Most common themes: CO₂ transportation and storage, electrification, hydrogen transport and hydrogen production offshore.

BEIS - Direct Air Capture

Partnering with a consortium made up of CO2CirculAir B.V, Process Design Center, Optimus, and the Research Centre for Carbon Solutions at Heriot-Watt University the project seeks to deliver a sustainable membrane absorption and regeneration technology for direct air capture (SMART-DAC), removing CO₂ or other greenhouse gases (GHGs) from the atmosphere.

Offshore Energy Digital and Data Taskforce

We launched the taskforce to develop an Offshore Energy Digital & Data Strategy with a clear set of recommendations and an action plan to facilitate greater digital collaboration, innovation and market development in offshore energy through improving data availability and transparency to help unlock new opportunities across the offshore energy sector.

Well Plug and Abandonment industry wide collaboration programme

The well P&A collaboration initiative has been driven by NZTC in recognition of the urgency needed to accelerate the pace at which technology is validated and qualified. Technologies will be trialled and tested in multi-operator collaboration field trials, enabling faster, lower-cost and wider industry adoption.

North East Scotland Hydrogen Ambition (NESH2A)

NESH2A Steering Committee was formed in May 2021, with the clear aim of coordinating efforts that support the delivery of over 1GW (20%) of the UK's low carbon hydrogen production target by 2032 and position the region to capitalise on future hydrogen export markets. The committee representatives are NZTC, Hydrasun, Storegga, ETZ Ltd, Aberdeen Renewable Energy Group (AREG), NESCoI, SGN Energy Futures, Scottish Enterprise and Aberdeen City Council.

To **deliver** a net zero energy industry we must **stimulate** new thinking and **innovation** at all levels

We work collaboratively with industry, regional bodies, schools, and universities to promote entrepreneurship and science, technology, engineering and maths (STEM). Young people are given an insight into the world of employment, through work experience. And everyone from school children, teachers and parents have access to the support and information needed to consider a career in the energy industry, engineering and the associated business functions.



“

I am passionate about inspiring the next generation, our internships and participation in the Career Ready students and Kickstart Scheme have provided 24 young people with the opportunity to connect with the world of work, providing them with workplace experiences, career insights, and a network of support for the future.

Laura Paterson, People and Organisational Development Director, NZTC

“

Being an intern at Net Zero Technology Centre was one the best learning experiences I have had. Not only has it has given me the opportunity to apply the theory I have learned at university to the workplace, but it has given me a taste of a busy working environment first hand. I would encourage anyone who has the opportunity to grab it and make the most of it!

**Rebecca Fisher,
HR Intern, NZTC**



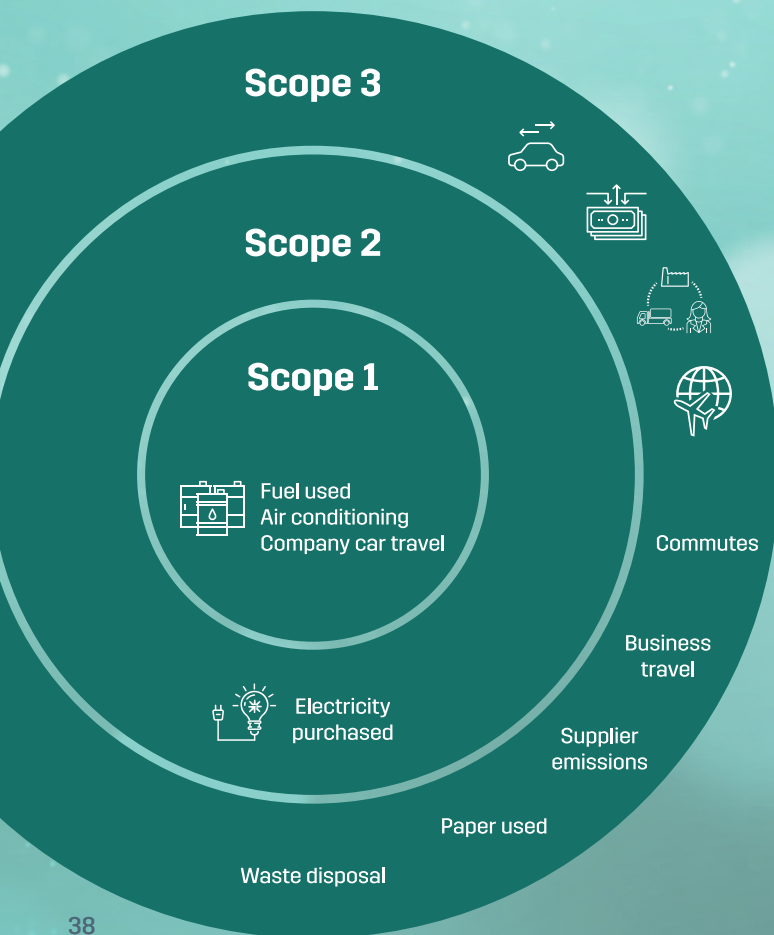
The University of Aberdeen's ABDN Grad Challenge brought together three Aberdeen based organisations to propose a challenge facing their organisation. We challenged the students to think of ideas around promoting Aberdeen as an attractive place to build a sustainable clean energy business.



The TechX team took part in the Robert Gordon University's Student Innovation Challenge and awarded internships for summer 2022 to the winning team, providing them with the opportunity to continue developing their innovative ideas.

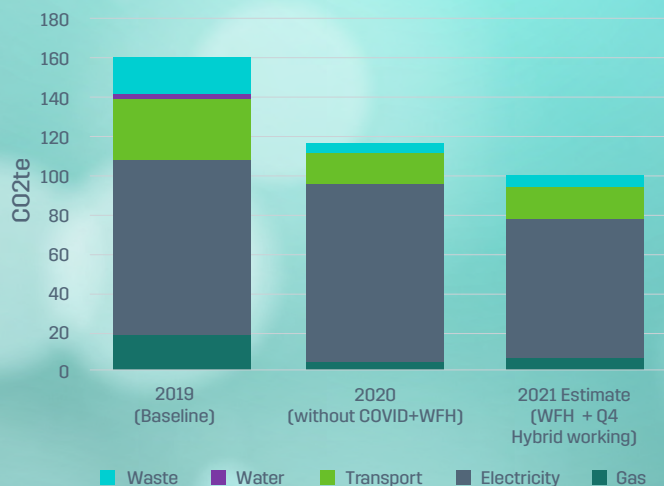
We are passionate about running our organisation in a sustainable way, and are proudly committed to the UN Sustainable Development Goals.

Our Sustainability Policy mitigates the organisation's carbon footprint, and puts us on the path to becoming a net zero organisation.



By working with a “mitigation first, offsetting second” ethos, to reach net zero by 2030 our Sustainability Team is helping NZTC reduce its Scope 1, 2 and 3 emissions, as well as inspiring our personnel to look at their own individual impacts, through events such as litter picking, and the use of the carbon footprint tracking and reduction app, Pawprint. For our employees that rely on travel by car, we have installed electric vehicle chargers at our offices, and finalised a salary sacrifice scheme for electric vehicles.

Net Zero Technology Centre Carbon Footprint



Harnessing employee energy

Pawprint
eco companion



"I am proud to be a part of the Sustainability Team, creating tangible opportunities for my colleagues to reduce their carbon footprint. Pawprint has been a fantastic resource for us especially during the sprints when everyone's competitive side comes to the fore which is great because it is a brilliant way to get to know your colleagues better and reduce our carbon footprint at the same time."

Sakshi Sircar, Project Engineer, NZTC

Pawprint was officially launched at the NZTC on 4th June 2021. As of March 2022, over 74.2% of staff are registered on the Pawprint app.

Three 'Pawprint Sprints' have been undertaken. In August 2021 the organisation reduced its carbon footprint by 0.17 tCO₂e, the second Sprint in November 2021 reduced our organisational footprint by 6 tCO₂e during the month.

A responsible, thoughtful employer that values our people and best practice

NZTC became an accredited Living Wage Employer in January 2022. This means that every member of staff at NZTC earns not just the minimum wage, but the Living Wage. The real Living Wage rates are independently calculated based on what people need to get by, ensuring employees earn a wage that meets the costs of living, not just the government minimum.



**Net Zero
Technology
Centre**

Technology Driving Transition

Our Board

Chaired by Martin Gilbert, our Board is responsible for the overall strategic direction and long-term success of NZTC. It is responsible for making sure we have the resources, controls, and governance we need to deliver our goals. Our Board meets regularly to review our strategies and policies and receives reports from our leadership team. It delegates to our Chief Executive Officer, who in turn delegates responsibility for specific activities to members of the leadership team.

Our audit committee

Chaired by Jeff Corray, our audit committee advises the Board on the effectiveness of our management procedures. It receives reports on risk, control and governance of the centre, offers advice to the Board and monitors the resulting actions.

Performance reporting

We regularly report our performance against a range of key indicators to the Aberdeen City Region Deal joint committee, which comprises senior representatives from the Aberdeen City and Aberdeenshire Councils and Opportunity North East (ONE).

	31 Mar 2021 £'000	31 Mar 2022 * £'000
Fixed Assets		
Tangible assets	1,281	1,044
Deferred tax asset	45	45
Current assets:		
Trade and other debtors	948	1,498
Cash at bank	5,431	11,204
Creditors: amounts falling due within one year	(7,705)	(13,791)
Net Current liabilities	(1,326)	(1,089)
Total assets less current liabilities	0	0
Deferred tax liability	0	0
Net Assets	0	0
Reserves	0	0
Retained earnings	0	0

*The financial statements are due to be approved and authorised by the Board in October 2022, following approval they will be issued.

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