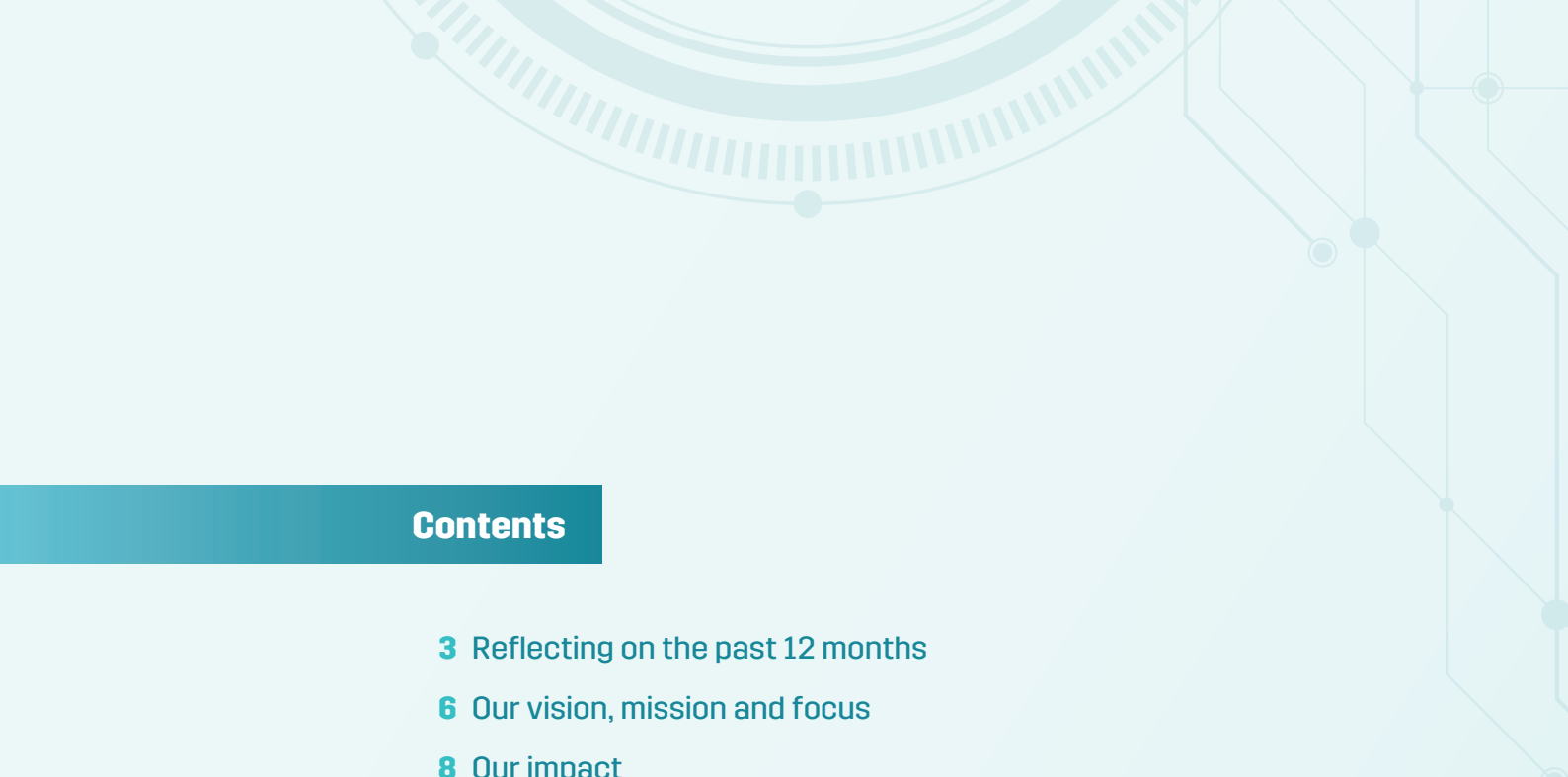


Annual Review

April 2024 – March 2025





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Reflecting on the past 12 months

Charting the course for a net zero future

Peter Mather
Chair

I am proud to present this year's annual review, a testament to the Net Zero Technology Centre's (NZTC's) enduring commitment to accelerating net zero.

From its base in the North East of Scotland, NZTC has grown into a globally recognised centre of excellence, one that is responding to the demands of the energy transition and helping to shape its trajectory.

This is a pivotal moment as NZTC prepares to move beyond its original ten-year funding period. This move reflects the Centre's maturity, its strategic alignment with national and international priorities and its readiness to lead through the next decade of energy innovation.

The progress made in the past year has served to strengthen the Board's confidence in NZTC's future. The organisation demonstrated sound governance, strategic clarity and strong delivery. Its partnerships – with industry, academia and government – have been catalytic. NZTC leads industry collaborations that are developing and deploying technologies essential to the energy transition.



“As global energy systems decentralise and decarbonise, the need for trusted, technically credible and purpose-driven organisations has never been greater.”

Looking ahead, the importance of NZTC's role will continue to grow. As global energy systems decentralise and decarbonise, the need for trusted, technically credible and purpose-driven organisations has never been greater. NZTC is uniquely positioned to fill that role in the UK and globally.

On behalf of the Board, I extend our deepest thanks to our partners, stakeholders and the exceptional team at NZTC. Your commitment and vision are the foundation of our shared success.

The decade ahead will demand courage, clarity and collaboration. NZTC is ready.

Shaping the future of energy from the North East

Myrtle Dawes
CEO

The future of energy is being shaped right here in Aberdeen and NZTC is proving that place-based innovation can deliver national and global impact. Across the UK, the energy sector is undergoing rapid transformation. NZTC is helping lead that change.

In 2024 we took the opportunity to reflect on how far we've come and to look ahead with renewed purpose. Our vision for the future builds on deep industry engagement, trusted partnerships and an unwavering confidence that technology will drive the energy transition. That vision is already materialising.

We have delivered a portfolio of commercial and government-funded projects that reflect the breadth of our ambition and the depth of our technical expertise.

“ Our vision for the future builds on deep industry engagement, trusted partnerships and an unwavering confidence that technology will drive the energy transition. ”

We have championed collaboration across operators and the wider industry to address complex challenges. Our wells decommissioning collaboration and sub-surface safety valve joint innovation achieved significant milestones, welcoming new members, raising millions of pounds in match funding and testing, piloting and validating emerging technologies.

We have also extended our support for innovators and entrepreneurs, with a further 12 energy startups joining our TechX Accelerator, making a total of 130 developers accelerated so far.

In early 2025, we successfully concluded the £16.5 million Net Zero Technology Transition Programme (NZTTP), which was funded by Scottish Government's Energy Transition Fund. This three-year initiative delivered seven pioneering projects to reduce emissions, accelerate clean energy innovation and strengthen Scotland's position as a global leader in the energy transition. From carbon capture to digital twins, NZTTP has helped accelerate solutions that are now being deployed across the energy sector.

“What makes all of this possible is the expertise, creativity and commitment of our people.”

Our impact is not just technological, it's economic. In FY24, we co-invested almost £40 million with industry, and since our inception we've helped create and safeguard more than 1,700 jobs.

What makes all of this possible is the expertise, creativity and commitment of our people. I'm proud of the culture we're building at NZTC, one that embraces change, values collaboration and is driven by purpose. I'd also like to thank our Board for their continued guidance and support. Their strategic insight and commitment have been instrumental in shaping our success to date and our vision for the future.

NZTC has already made a lasting impact and we're just getting started.



Our vision, mission and focus

Technology driving transition

NZTC is an established and proven national technology centre delivering UK supply chain growth



Vision

A net zero world, powered by technology innovation.



**Net Zero
Technology
Centre**
Technology Driving Transition



Mission

To work with industry, government and academia driving technology innovation to accelerate the energy transition to net zero.

Our commitments

NZTC has already exceeded the targets set in its first round of government funding, covering a ten-year period from 2016 to 2026:

Target:

£9Bn

GVA increase by 2036 (minimum)

£174M

match funding by 2026

15

commercialised technologies by 2026

100

accelerator projects by 2026

Actual:

£10Bn

GVA increase (forecast minimum)

£270M

match funding achieved

74

commercialised technologies achieved

130

startups accelerated

As of April 2025

We support net zero through:

Technology Trials

Trialling innovative new technologies to fast track their development and commercialisation – co-funded by industry

TechX Startup Acceleration

Propelling clean energy technology startups to commercialisation and beyond, and attracting equity funding into startups

Collaborative Industry Programmes

Bringing industry players together to address operational challenges through co-development, field trials and testing of technology. Sharing risks and costs and promoting standardisation efforts across the energy sector

Strategic Thought Leadership

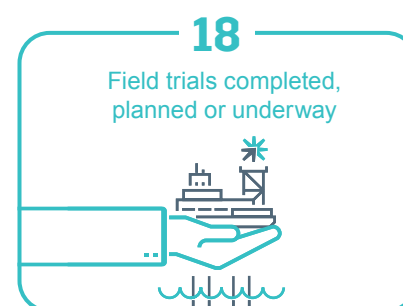
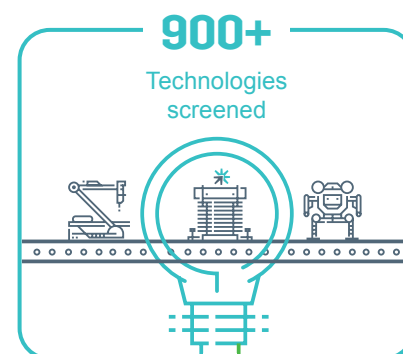
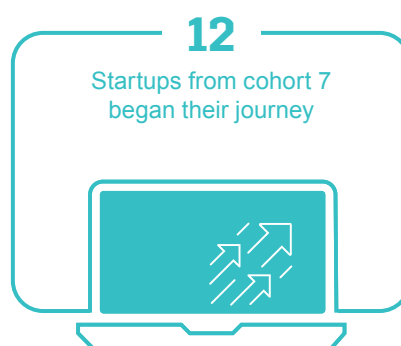
Publishing in-depth reports on net zero technology trends and first-of-a-kind projects and contributing to strategically important networks at local and national level

Net Zero Technology Advisory Services

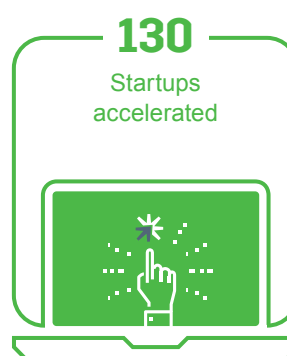
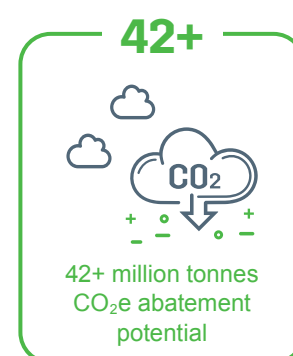
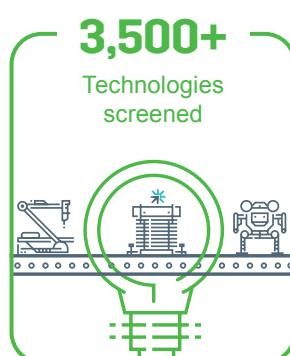
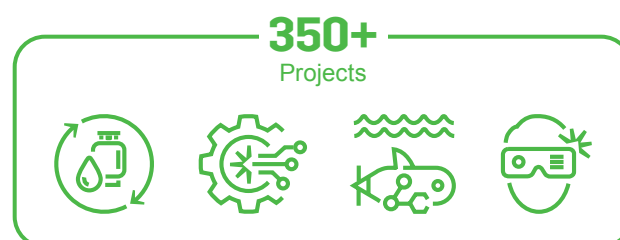
Providing expert insight and consultancy to international organisations seeking to accelerate their net zero progress through technology and innovation

Our impact

April 2024 – March 2025



Since inception



Developing and deploying technology

Driving efficiency, affordability and decarbonisation across the energy system through: Emissions reduction | Offshore renewables and grid Hydrogen and alternative fuels Carbon capture and storage (CCS) | Digital for net zero

We accelerate the development and deployment of technologies that reduce the carbon footprint of oil and gas and other high-emitting sectors. By leveraging the transferable skills, knowledge and infrastructure that make up the UK energy supply chain, we help build an integrated energy system that is resilient and future-ready.

Our work drives down the cost and scales up the reliability, accessibility and sustainability of clean energy technologies. This includes advancing low-carbon hydrogen, carbon capture, utilisation and storage (CCUS) and renewables, making them faster to deploy, easier to integrate and more affordable to store and transport.

In doing so, we directly support the resolution of the energy trilemma: delivering secure, equitable and sustainable energy for the UK and beyond.

Emissions reduction



While the UK continues its transition from fossil fuels to renewable energy, oil and gas remain essential to meeting current energy demand. The challenge is to meet the UK's energy needs as cleanly and efficiently as possible, supporting energy security and affordability while accelerating decarbonisation.

We are committed to reducing emissions from oil and gas production by developing and deploying cutting-edge technologies that manage, prevent and displace emissions across the value chain. These include platform electrification, methane leak detection, sustainable decommissioning and carbon-reducing innovations in drilling and offshore operations. NZTC is prioritising innovations in the following areas:



Decarbonised power: Prioritising the use of alternative fuels or small-scale renewables where electrification isn't feasible.



Flaring and venting: Developing solutions that eliminate venting and enable zero routine flaring by 2030.



Fugitive emissions: Improving real-time monitoring and advancing leak detection.



Asset integrity: Addressing challenges such as Corrosion Under Insulation (CUI), we leverage software and hardware technology to ensure asset integrity.



Asset efficiency: Enhancing production efficiency through the utilisation of software and hardware.



Decommissioning: Finding alternatives to cement plug and abandonment and identify methods of sustainable removal. We're actively field-trialling technology to optimise and streamline global decommissioning activities.

We amplify our impact in the oil and gas industry by bringing energy operators, innovators and the supply chain together to share problems and co-create solutions. Learn more about our collaborative industry programmes on p36.

Offshore renewables and grid



The UK's abundant marine resources and strong supply chain position it to lead offshore renewables. Floating wind, wave and tidal energy offer reliable clean power essential to net zero.

Achieving ambitious UK targets depends on faster grid development, cost reduction and smart supply chain use. NZTC is accelerating progress by:



Scaling: Supporting early-stage floating wind trials to de-risk and reduce costs ahead of large-scale rollout



Integrating: Minimising curtailment and increasing system flexibility to maximise clean energy use



Transitioning: Enabling the UK supply chain to capture economic benefit and create green jobs

Hydrogen and alternative fuels



Hydrogen has an important role to play in decarbonising industry, shipping and aviation. It supports alternative fuels such as e-methanol and green ammonia and offers large-scale storage to balance intermittent renewables.

With a growing project pipeline, the UK is well placed to lead domestic and export markets. NZTC is focused on seizing this opportunity by:



Making: Reducing costs and improving performance across production technologies through optimisation and digital integration



Moving: Developing transport infrastructure to support industrial-scale deployment



Storing: Enabling flexible, reliable storage to support a fully integrated energy system

Carbon capture and storage (CCS)



Carbon capture and storage is essential to the UK's net zero plan. The Climate Change Committee states that there is no credible path without it. CCS reduces emissions from industry and power and enables removals like bioenergy with carbon capture and storage and direct air carbon capture and storage, crucial for offsetting residual emissions.

With 78 Gt of offshore CO₂ storage and government backing for four CCS clusters by 2030, rapid growth could unlock £7 billion in supply chain value, create 50,000 jobs and secure UK leadership. NZTC is driving this growth by:



Capturing: Accelerating modular and next generation capture technologies to reduce cost and enable early deployment



Moving: Advancing materials science and monitoring systems to support safe and efficient CO₂ transport at scale



Storing: Fast-tracking storage site appraisal and long-term monitoring solutions to build a self-sustaining CCS market

Digital for net zero



Rapid digitalisation is reshaping the energy sector, making data-driven, digital-first approaches a strategic priority. However, deployment has been slow. To keep pace with increasingly complex networks and new investment, dedicated strategies are needed to accelerate adoption.

NZTC is defining a clear path to help digital tools unlock new operating models, improve processes and transform how energy is produced and consumed. We do this by:



Enabling: Applying new technologies to create fresh capabilities, data insights and efficiencies across energy systems



Enhancing: Building on existing processes to improve performance and support optimised outcomes



Evolving: Developing advanced, transformative solutions that introduce new business models and help achieve net zero ambitions

Net zero technology and innovation priorities 2025 to 2035

The actions we take over the next decade will shape the future of our energy system and industrial economy. Investment in innovative technology is essential to accelerate the energy transition, reduce the green premium and develop a net zero supply chain and high-value jobs.

Our *Net Zero Technology: Innovation Priorities 2025 to 2035* report explores strategic imperatives and the associated economic and commercial opportunities. It also serves as a call for greater collaboration to accelerate progress through technology.

Through the programmes outlined in this report – accelerating technology trials, startups, infrastructure projects and industrial collaborations – NZTC sets out how we will create new skilled jobs and commercialise over 20 innovative technologies to support an affordable transition to net zero.



**Download the
Innovation
Priorities report:**



Groundbreaking projects that continue to deliver

Over the past 12 months, NZTC has partnered with developers, led industry collaborations and engaged across the supply chain, academia and government to advance a diverse range of initiatives. Drawing on our expertise in managing complex projects and driving innovation from concept to commercialisation, these milestones and case studies highlight the tangible progress and impact we continue to deliver.



Emissions reduction

NZTC technology roadmap identifies 50+ emissions reduction solutions

In early 2025 NZTC, in partnership with the North Sea Transition Authority, published the Emissions Reduction Technology Roadmap for the Technology Leadership Board, with input from Offshore Energies UK. The roadmap outlines a targeted set of practical solutions to reduce greenhouse gas emissions from key sources including power generation, flaring and venting and fugitive emissions.

Developed as a key resource for industry, the report provided:

- A catalogue of over 50 adoptable technologies including low-carbon alternative fuels, efficient flare combustion and advanced digital tools
- A structured deployment pathway offering operators practical guidance on operational modifications and process improvements

The roadmap was unveiled at a showcase event in February 2025, attended by nearly 70 stakeholders from across the operator and supply chain community. Developed to support the creation and implementation of emissions reduction action plans,



the roadmap underpins the industry's targets agreed with the UK Government and reaffirms a shared commitment to accelerating decarbonisation across the UK's offshore energy sector.



Explore the roadmap and the technologies featured by downloading the report.





Emissions reduction



Spotlight



Accord ESL: Driving methane emission reductions

Aberdeen-based Accord ESL, with support from NZTC, developed the Accord Combustor – a real-time simulation model that provides minute-by-minute methane and CO₂ emissions data from flaring. NZTC funding refined the model to improve combustion efficiency, helping operators reduce methane emissions with a projected basin-wide saving of 1.4 million tonnes of CO₂e.

In October 2024, Accord's Combustor was successfully trialled at TotalEnergies' Culzean gas

field alongside Flylogix, a drone-based methane monitoring company. Flylogix, another developer supported by NZTC, conducted top-down methane measurements to validate emissions estimates alongside Accord's Combustor, demonstrating how Accord's technology supports accurate cost-effective emissions monitoring and regulatory compliance.

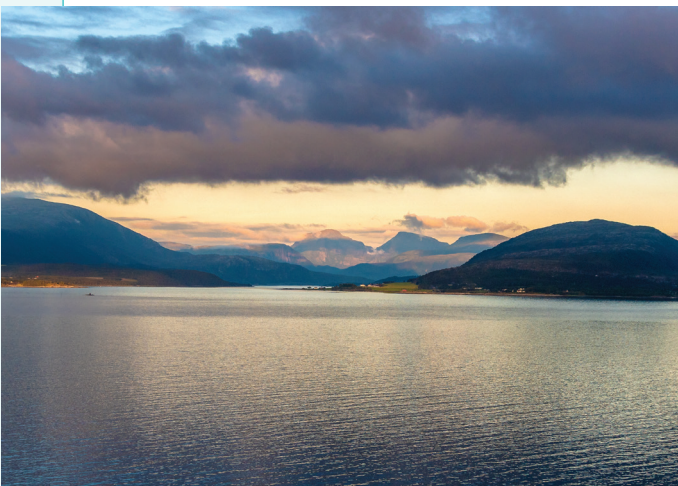


Trondheimfjord trials propel Sulmara's remote decommissioning technology

Decommissioning offshore energy assets requires complex surveys traditionally carried out by large crewed vessels. These vessels contribute significantly to emissions, safety risks and operational

costs. Sulmara's remote maritime system offers a breakthrough alternative by combining an uncrewed surface vessel with a remotely operated towed vehicle, automated launch and recovery, advanced sensor payloads and real-time data transfer. This integrated solution reduces emissions and costs without compromising safety or survey quality. With NZTC's support, Sulmara completed key trials in Trondheimfjord, Norway over Summer and Autumn 2024. These tests validated the platform's endurance, reliable remote control and automated data acquisition in water depths from 30 to 250 metres.

The need to shift to uncrewed remote operations for offshore asset surveys is globally recognised. Sulmara's low-cost, high-endurance system can relay data via SatCom links directly to a Remote Command Centre, enabling faster decisions and greater efficiency. This technology places Scotland and the UK at the forefront as manufacturers and service providers in a market with strong global export potential.





Offshore renewables and grid



Dual-purpose artificial reefs for subsea protection

Traditional subsea protection methods such as concrete mattresses and rock bags are costly to remove, offer little ecological value and can damage marine habitats. With increasing regulatory and stakeholder pressure, the energy sector is actively seeking nature-inclusive low-carbon alternatives that support decommissioning obligations and biodiversity objectives.

Aberdeen-based Build the Reef has developed a modular artificial reef system using waste shell material from the shellfish industry combined with other low-carbon components. Engineered to encourage marine life colonisation, the structures enhance biodiversity while reducing emissions, costs and operational complexity. Compatible with standard offshore installation practices, the reef can remain in place at end of life, offering a sustainable solution across oil and gas, renewables and aquaculture applications.

In 2025 Build the Reef successfully deployed 10 tonnes of reef blocks and test tiles offshore on the West Coast of Scotland, progressing the technology from TRL 6 to 7. This real-world deployment supported by funding from NZTC will provide valuable operational and ecological data.

In parallel Build the Reef is developing a marine-friendly plastic-free rope to replace the polypropylene rope widely used offshore. The alternative prevents microplastic shedding while matching existing strength and performance.

By combining the reef structures with this rope technology, the company plans to launch subsea protection products such as eco-friendly bio-concrete mattresses that can remain on the seabed after use. These solutions will reduce carbon footprint, enhance biodiversity and improve operational efficiency, cutting time, cost and resource demands for offshore operators.



The INTOG Innovation Network

In May 2024, NZTC and Offshore Renewable Energy (ORE) Catapult launched the Innovation and Targeted Oil & Gas (INTOG) Innovation Network focused on driving floating offshore wind innovation through the

INTOG leasing process. This network is dedicated to maximising the impact of floating wind projects by fostering research, development and collaboration among INTOG leasing round participants.

ORE Catapult and NZTC launched the Vanguard Innovation Programme to pinpoint and act on the key innovation areas where developers can collaborate. The programme's roadmapping study aims to refine these priority areas, advancing innovation in floating offshore wind, driving down cost and contributing to the UK's net zero targets. By identifying opportunities for collaborative innovation and at-sea testing, the Vanguard programme seeks to accelerate the adoption of floating offshore wind technology, benefiting future commercial scale floating wind projects in the UK and globally.





Hydrogen and alternative fuels

Insights from the HOP2 initiative: Unlocking offshore green hydrogen through repurposed infrastructure

Developing large-scale offshore green hydrogen production involves significant technical, economic and regulatory challenges. Repurposing existing UK Continental Shelf (UKCS) oil and gas infrastructure offers a promising opportunity, but uncertainties remain around asset reuse, technology selection, storage solutions and the regulatory framework. Offshore production costs are also higher than onshore alternatives.

The Hydrogen Offshore Production Project (HOP2) was initiated to address these challenges by assessing the practicality and viability of producing 500MW of offshore green hydrogen. Funded with £2.1 million from the Scottish Government's Just Transition Fund, HOP2 completed its first phase in 2024.

HOP2 explored how oil and gas infrastructure could be repurposed and found that while jackets and substructures can be reused, new topsides would be needed. It identified proton exchange membrane electrolysis as the most suitable technology for early use. The study also flagged important considerations around storage, safety and regulation.

Phase 1 helped identify technical and economic challenges, confirmed which technologies and reuse options are viable and highlighted regulatory gaps that need to be addressed to support development. It also offered valuable insights to guide future policy and investment.

Building on this, Phase 2 is now focused on shaping the concepts in more detail – refining the engineering to improve layout, reduce weight and enhance overall efficiency, which will be completed late 2025. Phase 3 is expected to finish in 2026 and will focus on supporting hydrogen technology development, moving towards offshore hydrogen production to help meet net zero goals.



**Download the HOP2
Phase 1 Concept
Development report:**



Emerald hydrogen powers peak performance

Hull-based company HiiROC, with support from NZTC and Centrica Business Solutions, is demonstrating the potential for hydrogen to decarbonise the UK's flexible power generation sector. These short-notice peaking plants play a vital role in grid stability but are traditionally reliant on fossil fuels.

At the core of the project is HiiROC's proprietary thermal plasma electrolysis technology, which converts hydrocarbons such as biomethane or natural gas into hydrogen and solid carbon. The result is "Emerald Hydrogen" – a low-emissions fuel with added commercial value through carbon black, a useful industrial by-product. The process avoids CO₂ emissions at the point of production.

Over the past year hydrogen compression and storage units have been delivered and installed on site. The field trial is expected to be completed in mid-2025, with hydrogen to be produced and blended

into the natural gas supply that powers the plant's generators. The team is gathering performance and emissions data to evaluate the technology's impact and potential for broader use.

Recognised with Hydrogen UK's Innovation Project award in 2024, the initiative demonstrates a practical route to low-carbon peak power without the need to replace existing infrastructure. Its modular design supports scale-up and replication across similar sites. Early insights will inform Centrica's broader decarbonisation strategy and help accelerate the adoption of clean hydrogen solutions in other energy-intensive sectors.





Carbon capture and storage (CCS)

Advancing direct air capture (DAC) technologies

NZTC is at the forefront of supporting innovative DAC technologies to address the urgent challenge of greenhouse gas removal. Two pioneering projects, Mission Zero and SMART-DAC, are driving the development of scalable, cost-effective and sustainable solutions to capture CO₂ directly from the atmosphere.

Mission Zero, a TechX Accelerator alum, has developed an electrochemical DAC technology that operates at ambient temperatures and pressures, consuming significantly less energy compared to traditional methods and enhancing efficiency with faster solvents.

NZTC also supports CO2CirculAir, first profiled by NZTC through its COP27 Pitch Battle. The company's

 **MissionZero**

CO2CirculAir
Smart Direct Air Capture



SMART-DAC technology, uses natural wind and a non-toxic absorbent material to remove CO₂, integrating membrane gas absorption with electrochemical regeneration. It is powered by low-cost, surplus green energy.



Both technologies offer modular systems for scalable deployment, supporting green fuel production and contributing to net zero targets in various sectors. By late 2024, Mission Zero employed 40 people, while SMART-DAC had completed 467 operational days between September 2023 and March 2025, capturing at rates in excess 100 tonnes of CO₂ per year with a final CO₂ purity of over 98%.

Developer journeys: A decade with NZTC

The developers below have benefited from NZTC's broad support over the last decade – from startup acceleration to technology trials and wider industry collaboration. The past year has seen them continue to make progress and deliver meaningful breakthroughs.

BSC's compact solution prepares for offshore deployment

BSC Separation Technology is addressing one of the offshore industry's most persistent challenges: managing produced water and multiphase flow in compact environments. Its hydro-turbine powered separator is significantly smaller and lighter than conventional systems yet delivers exceptional performance. Designed for modularity and energy efficiency, the solution is now optimised for produced water treatment and system de-bottlenecking.

Since 2019, NZTC has supported BSC through its TechX Accelerator and the Net Zero R&D Programme, helping to advance the compact separator technology from concept to field-ready.

In 2024, BSC completed a two-year design, build and test programme with NZTC and key partners including Hayward Tyler, Expro, Ithaca and



CNOOC, successfully meeting all key milestones. These achievements included performance verification through computational modelling, building and testing a scaled prototype in a laboratory, completing a feasibility study on a compact stripping tower for CO₂ capture and hydrogen sulphide removal, and delivering a certified field test unit for live offshore trials.

Revolutionising CUI detection with SubTera

SubTera's S.T.A.R. – scan, track, analyse and report - system is redefining how corrosion under insulation (CUI) is detected. Using advanced sub-terahertz sensing, this handheld device inspects insulated industrial pipework without disrupting operations. The technology reduces inspection costs, supports early intervention and helps cut fugitive emissions.

NZTC supported SubTera through its Solutions Centre back in 2019, offering tailored technical expertise and validation support. The company also received funding as part of NZTC's Open Innovation Programme, winning a share of £8 million awarded to pioneering net zero technologies. This backing enabled further development of the platform's hardware, usability and cloud-connected analytics, and accelerated progress on integrating AI for automated corrosion detection.

In the last year, SubTera achieved major milestones. In October 2024, SubTera expanded



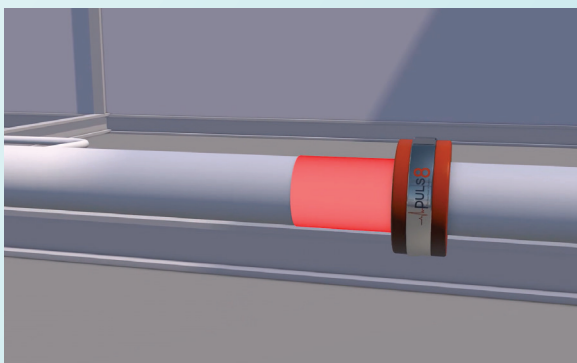
its team and opened a new office in Aberdeen, increasing its capacity to serve the energy sector. A field trial in Germany in December 2024 demonstrated strong performance in real-world conditions. Its Pi360 platform, the foundation of S.T.A.R., was successfully qualified by DNV in April 2025.

SubTera's technology is now positioned to scale across global industrial sites, helping operators reduce maintenance costs, improve safety and cut emissions associated with CUI.

Puls8 technology acquired by bp for global deployment

Accurate pipework and tubing identification on industrial sites is critical but remains a persistent challenge. Misidentification can lead to unplanned releases and fugitive emissions, increasing safety risks and driving up operational costs.

To address this, Puls8 developed a non-invasive hand-held Pulser Tooling system. Intrinsically safe and portable, the tool allows personnel across disciplines to quickly and accurately verify pipework, hoses and small-bore tubing that may otherwise be difficult to identify using conventional methods. By improving identification accuracy and reducing delays, the technology delivers up to 50% time savings on average offshore maintenance tasks. Estimated annual savings to a single asset are around £785K when accounting for helicopter travel, subsistence and deferred production.



Puls8 joined NZTC's TechX Accelerator in 2020 and won the bp Technology Award. With follow-on support including funding, access to expert guidance and industry partners, the team developed a complete solution comprising a transmitter system, receiver, signal analysis software, data collection app and smart device integration. The system was successfully tested at multiple onshore and offshore sites. Key outcomes included an expanded range of compatible materials and systems, increased testing distances and validation of the tool's algorithm with input from end users.

In 2024, Puls8 was acquired by energy major bp. The acquisition has allowed Puls8 to explore the technology roadmap with parallel activities including data gathering, cable identification and anomaly detection. The tool is now being prepared for global deployment to support safer and more efficient pipe identification, marking a major milestone in its commercial journey.



Hear from Paul McMillan,
Co-Founder of Puls8:

Industry collaborations driving transformation

NZTC has played a leading role in bringing operators and the wider industry together to take a shared approach to complex challenges, advancing standardisation and setting a benchmark for cost and efficiency in targeted areas.

Wells Decommissioning Collaboration

Now in its third year, NZTC's Wells Decommissioning Collaboration brings together major operators from around the world with the objective to develop, test and trial new technologies to reduce the cost associated with well plug and abandonment (P&A).

Funded by the operator consortium, this collective approach helps reduce financial exposure to a single operator, lower costs and improve the efficiency of well P&A. Over the past year, the initiative has gained significant momentum.

Expansion into Norway

In mid-2024, the Wells Decommissioning Collaboration cemented its expansion into Norway with energy majors Equinor and OKEA joining the collaboration. The collaboration is now supported by seven world leading operators raising over £2.1M per year for technology pilots.



Sourcing rigless P&A technology

In May 2024, the collaboration, in partnership with Energy Transition Norway, the Danish Offshore Technology Centre, the Centre of Decommissioning Australia and the Petroleum Technology Alliance Canada, launched a call to find innovations enabling rigless plug and abandonment. These solutions are crucial for helping operators meet regulatory requirements and address technical challenges such as rigless wellbore access.

Successful applicants will have the opportunity to engage with Wells Decommissioning Collaboration members and the partners involved in this campaign. The call attracted 35 promising submissions for NZTC's review.



UKCS trial strengthens case for electrically set bismuth plug consent

In June 2024, the collaboration supported an offshore trial on TAQA's Cormorant North Platform to deploy the world's first electrically-set bismuth plug as an environmental barrier. The mobilisation, rig-up and initial installation offered valuable insights, demonstrating the technology's credibility to support future regulatory consent in the UKCS. Building on this progress, the technology is now preparing for a two-well pilot in TotalEnergies' Barnett field in Fort Worth, Texas in summer 2025.



Standardising the qualification of new materials for plug and abandonment



NZTC and Astrimar have initiated an 18-month project to develop a new Well Plug and Abandonment Technology Qualification Framework. This is being carried out with the seven operators who are part of the Well Decommissioning Collaboration, the North Sea Transition Authority, HSE and Havtil as well as a range of technology developers.

Aligned with recognised international standards, it sets out a structured six-step process with interactive worksheets to demonstrate technical readiness and reduce deployment risk for new barrier technologies.

The framework supports qualification across all material and barrier types and applies in multiple regions. It defines clear roles for developers, operators and regulators, whether demonstrating alternative materials, assessing new technologies or evaluating evidence against accepted practices.

The framework and accompanying guidance documents will be publicly available by mid-2025.



Sub-surface safety valve joint innovation

Sub-surface safety valves (SSSVs) are critical to well integrity but face severe performance challenges in CCUS environments where the Joule-Thomson cooling effect can cause temperatures to drop to -78°C , well below the operational limit of most commercial valves.

With no existing standards or full system testing protocols for these conditions, NZTC led a collaborative effort with nine industry partners and three technology developers to close the gap.

The project delivered a CCUS-specific qualification programme by adapting and extending API 14A standards to validate safety valves under extreme conditions. Key deliverables included full valve testing across a range of sizes, successful cycling at temperatures down to -78.5°C , validation of materials and control line fluids, failure risk mitigation and the submission of a new test procedure to the American Petroleum Institute for future standardisation.

A qualified portfolio of valves is now commercially available across three major service companies, Baker Hughes, Halliburton and SLB, offering operators greater confidence and flexibility. The project closed successfully in 2025 and established a foundation for further CCUS well completions technology qualification and industry collaboration.





Net Zero Technology Transition Programme – Three years on

The Net Zero Technology Transition Programme (NZTTP) harnesses Scotland's energy expertise to deliver green growth, create jobs and promote development of new concepts and technologies.

Backed by £16.5 million from the Scottish Government's Energy Transition Fund (ETF) and match-funded by industry, NZTTP supports seven interconnected projects driving technology development and creating a hydrogen and derivatives export market. These projects have continued to demonstrate rapid growth in the last year.

In early 2025, the 'NZTTP Into the Future' showcase event offered insight into the progress made in the last three years. This was an opportunity to examine the critical next steps to secure these projects' place in the future energy mix. The event brought together key industry experts, developers and operators.



Showcase event



60
attendees



3
exhibitors



7
projects



Energy Hubs

Energy hubs will enable global energy exports by developing GW-scale low carbon hydrogen and alternative fuel production capabilities, leveraging Scotland's abundant natural resources to drive the energy transition.

In June 2024, NZTC released 'Energy Hubs: Fill the Backbone', providing recommendations to help scale Scotland's hydrogen production and position Scotland as a leader in the hydrogen economy.

As part the project, NZTC hosted an electrolyser competition, with the aim to discover and support the development of critical solutions to accelerate next-generation hydrogen production. In October 2024, three UK-based developers were awarded a share of £500,000 to scale their breakthrough technologies with the goal to pilot:



Download the
Energy Hubs: Fill the
Backbone report:



LD

- **Latent Drive's 'SeaStack'** technology is a game-changing seawater-to-hydrogen electrolyser with a unique cell design to leverage the properties of seawater, eliminating the need for water purification and significantly reducing costs. SeaStack enables the offshore production of hydrogen, capturing more wind energy at lower costs, and paving the way for more efficient and sustainable green hydrogen generation.

AqSorp

- **Aqsorption's** high-pressure, membraneless electrolyser technology operates at higher pressures than other technologies, reducing maintenance costs. The system efficiency will be boosted even further by recapturing kinetic energy from the high-pressure oxygen output.

Clyde
Hydrogen

- **Clyde Hydrogen Systems** has developed an innovative decoupled electrolysis technology that produces hydrogen and oxygen separately at different times and rates, enhancing safety and reducing costs. The technology generates high pressure hydrogen and is highly compatible with intermittent renewable energy sources, allowing gas to be produced even at low power inputs.



Latent Drive's 'SeaStack' technology





Hydrogen Backbone Link

The Hydrogen Backbone Link (HBL) project is focused on developing the critical infrastructure required to transport hydrogen from Scotland to Europe to support both the UK's and Europe's decarbonisation targets. Through a detailed analysis of pipeline installation options and distribution network development, the HBL project confirmed the feasibility of a new pipeline from Scotland to Europe.

In 2024, the development of this pipeline continues, enhancing connections from the west of Scotland, Ireland and England, while also exploring routing options to Germany, the Port of Rotterdam and AquaDuctus – 400km offshore from Germany.



Alternative Fuels and Gas Turbines (AFGT)

This project has developed a cost-effective retrofittable solution for existing gas turbines to decarbonise power generation across Scotland's oil and gas operations, enabling offshore assets to operate using low carbon alternative fuels with minor retrofittable modifications.

Following a world-first demonstration of a gas turbine successfully operating on green methanol, Siemens Energy, in collaboration with NZTC, carried out a second successful demonstration in late 2024. In this demonstration, a more powerful gas turbine ran on methanol without extensive modifications, showcasing significant emission reduction opportunities for both onshore and offshore power generation.



Offshore Low Touch Energy Robotics and Autonomous Systems (OLTER)

OLTER set out to accelerate the deployment and commercialisation of robotics and autonomous technologies in the energy sector, improving safety, and reducing costs and carbon footprint.

In 2024, Skyports, in collaboration with OLTER, carried out an impressive Beyond Visual Line of Sight (BVLOS) demonstration, pushing the boundaries of what's possible. This groundbreaking effort led to Equinor commissioning Skyports drones to fly from asset to asset offshore in Norway, showcasing the future of autonomous operations. The project also emphasised the immense value of sharing offshore inspection data across the industry. By using AI and machine learning to identify anomalies through a Data Hub proof of concept, OLTER is setting new standards for efficiency and innovation in the energy sector.



Data for Net Zero (D4NZ)

The Data for Net Zero (D4NZ) project aimed to bridge critical gaps in cross-industry data sharing by offering robust tools and a holistic visualisation of the UK Continental Shelf, unlocking investment and stimulating new technologies for net zero.

D4NZ developed an integrated suite of data science, visualisation and modelling capabilities to deliver the world's first Smart Energy Basin Service that can connect the energy landscape at basin level and across sectors to support technical and economic efficiencies.

In 2024, the project achieved major milestones, including the creation of an AI-driven Energy Hub Planning tool to optimise windfarm cable layouts. It also developed a Workforce Planning Framework with algorithms to boost staff training and development. Another standout achievement was a tool designed to analyse the impact of offshore wind developments on commercial fishing.



Advancing Remote Operations (ARO)

ARO set out to advance the adoption of remote operations across the UK continental shelf, enhancing safety, efficiency and sustainability ultimately reducing the offshore CO2 footprint by leveraging advanced technologies to optimise operations and cut emissions.

Last year, ARO conducted two significant field trials: a drone delivery trial on an offshore wind platform, showcasing the potential of unmanned logistics to reduce emissions, costs and vessel dependency and an oil and gas trial using digital twins and laser scan data for remote planning, vendor engagement and minor modifications. Additionally, ARO developed a cross-sector Technology Playbook to support broader implementation and strengthen the case for the Digital Energy Nexus (DEN), a proposed digital adoption centre in Aberdeen.



Offshore Energy Digital Architecture (OEDA):

The OEDA project set out to make data sharing easier across the offshore energy industry — helping companies work together, make better decisions and cut emissions. Completed in early 2024, the project delivered a full project report and a new framework for how data could be shared securely and effectively. OEDA explored what's needed both technically and practically to build a shared digital system.

Key highlights included a review of current data sharing practices, a model to understand costs and benefits and a pilot design showing how different data systems could work together. The project also tested a prototype service to show what's possible. By improving access to data, OEDA showed how the sector can become more connected, efficient and innovative, laying the foundations for a smarter, more collaborative offshore energy system.

Accelerating clean energy startups

Fast-tracking bold entrepreneurs for net zero progress



Now in its seventh year, NZTC's TechX Clean Energy Accelerator continues to advance clean energy innovation and stimulate economic growth by supporting entrepreneurs.

Focused on high-impact, complex technologies with the potential to transform the energy system, TechX offers tailored support through NZTC's broad industry network. By providing grant funding, hands on mentorship and expert guidance tailored to each startup's technical focus, TechX attracts outstanding founders and breakthrough technologies that are critical to net zero progress.

In late 2024, the programme was reshaped to strengthen support, shaped by alumni feedback and insights from six cohorts. By continuing to evolve with the needs of ambitious entrepreneurs, TechX remains a catalyst for clean energy innovation.

Key updates include:



An extended 18-week format to allow deeper engagement



Four structured blocks covering technology, business, funding and growth



60+ eLearning modules through the enhanced TechX portal



40+ hours of virtual workshops and one-to-one mentoring with partners



Milestone events at the end of each block to test skills and grow networks

Enabling growth through industry partnerships

TechX's support network includes its strategic partner ConocoPhillips, which continues to offer invaluable support to the startups, including sponsoring an additional cash prize for one high-performing company at the end of the programme. This is complemented by professional services partner Accenture, which delivers an enhanced investor-readiness programme to help startups prepare for future growth.



Meet NZTC's 2025 TechX cohort

The latest TechX cohort launched in February 2025, consisting of 12 startups selected from over 175 applications, spanning 33 countries. The companies are advancing new solutions across low carbon hydrogen and alternative fuels, CCUS and methane capture, renewables and grid, and industrial decarbonisation.



How 2025's cohort is driving decarbonisation and clean energy:



AED Energy: Low-cost thermal batteries that store renewable energy as heat and use photovoltaic (PV) cells to deliver on-demand electricity and heat, supporting a clean, reliable energy system.



Global OTEC: A system harnessing ocean temperature differences to provide reliable, low-carbon power for offshore operations, reducing fuel use, costs and emissions.



Plasma2X: A reactor that converts air and water into nitric acid or green ammonia using plasma and electrocatalysis, enabling sustainable fuel and fertiliser production without fossil fuels or CO₂ emissions.



CGEN Engineering: A lightweight, modular generator that cuts costs, simplifies maintenance and boosts the efficiency of wind energy production.



HotGreen: A modular compressor technology that cuts industrial heat pump costs and payback times by combining two mature manufacturing methods to deliver high efficiency.



Protonera: Transforms mixed and contaminated plastics into low-carbon hydrogen and recycled plastics at low temperatures, lowering the cost of green hydrogen production.



EBB-FLOW: A flexible, low-cost wave energy converter that uses scalable, mass-produced generator cells to make ocean power more affordable and reliable.



Kondor: A software platform using AI and digital twins to offer actionable insights, helping oil and gas operations enhance energy efficiency, reduce costs and cut emissions.



Remedium Energy: Combines a heat battery with advanced materials to develop a carbon capture system that removes more CO₂ and lowers costs for heavy industry.



Entropyst: A reactor that transforms methane into 'turquoise' hydrogen and solid carbon nanotubes, offering a scalable, low-cost and compact solution for generating low carbon hydrogen.



PEM Technologies: A modular electrolyser that simplifies design, eliminates rare earth elements and ensures easy maintenance, reducing hydrogen production costs.



SoLead Energy: Develops a safer, more sustainable soluble lead flow battery as an alternative to lithium-ion for long-duration energy storage.



Read more about our 2025 cohort



Startup spotlight

PEM Technologies

Hydrogen production is essential to net zero, but current electrolyzers are expensive, hard to maintain and reliant on scarce materials. Founded in 2024, Scottish startup PEM Technologies is tackling these issues with a patent-pending proton exchange membrane electrolyser made using waste-derived materials.

The modular system is projected to cut material costs by up to 35% and features the world's first "hot" cell replacement, allowing quick changeovers without full shutdown. This is expected to reduce downtime from days to around an hour. Designed for performance, sustainability and ease of servicing, PEM Technologies offers a practical route to more scalable, cost-effective low-carbon hydrogen.



“ Our 2025 cohort introduced 12 high-potential innovators to our growing ecosystem of clean energy pioneers.

This year's cohort highlights the transformative role startups play in the transition to net zero, bringing fresh thinking and turning cutting-edge ideas into practical solutions.

Through our TechX Accelerator, they have collaborated with world-class experts to refine and scale their innovations, accelerating their path to commercial success while driving impactful progress in decarbonisation and affordable clean energy.

Mark Anderson

Chief Acceleration Officer and TechX Director

”



TechX Alumni: Rapid growth, real impact

NZTC's TechX alumni now includes 81 startups, with 90% still thriving. These companies continue to grow technologically and commercially, securing additional funding, investment and market access. Collectively, they have achieved:



£170m
in equity investment



£36m
in revenue



380+
jobs created

H2CHP raises over £2M funding

2024 alum

Durham-based H2CHP continues to develop its high-efficiency, fuel-flexible power system to help industrial sites and ports decarbonise without compromising reliability. Designed for off-grid industrial and maritime use, its proprietary free piston generator delivers more than 45% efficiency and allows seamless

switching between liquid and gaseous fuels, including hydrogen and biogas, as they become viable. With no mechanical drivetrain and advanced software control, the system offers a practical zero emission alternative to conventional power sources.

Since completing TechX in June 2024, H2CHP has secured significant funding, including £600,000 in equity from TRICAPITAL Angels and a £1.3 million grant from Innovate UK to support prototype development and industrial trials. The company is on track to deliver its first working prototype by mid-2025 and plans to expand operations in Aberdeen and Edinburgh, with new hires in sales and operations as it moves towards commercialisation. In the last year H2CHP has grown its team by 10 employees, including senior mechanical and electrical engineers.



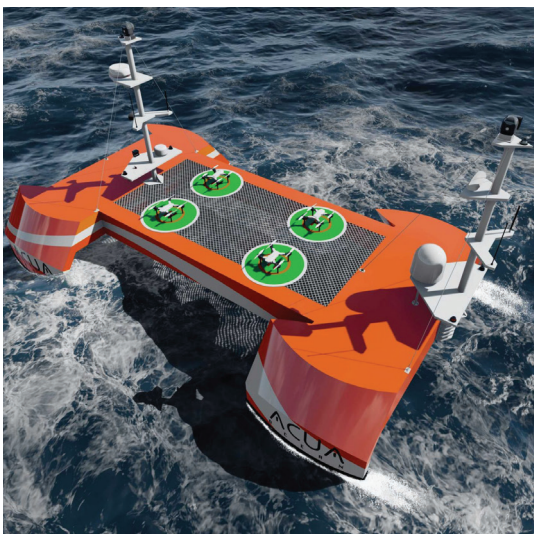


ACUA Ocean launches hydrogen-powered USV

2023 alum

Plymouth-based ACUA Ocean is making strong progress with its hydrogen-powered uncrewed surface vessel (H-USV), engineered for endurance ocean monitoring and protection. Designed to operate in sea states over three metres, the vessel provides a safer, more efficient alternative to diesel crewed ships in remote offshore environments. While renewable-powered USVs are emerging, many are constrained by weather or limited sensor capabilities. ACUA Ocean's hydrogen powertrain delivers endurance, stability and payload capacity to meet the demands of offshore infrastructure and energy sectors.

In December 2024, the company closed a £1.5 million pre-seed round co-led by StealthPoint and Britbots and secured £4 million in R&D grant funding from the Department for Environment, Food and Rural Affairs and the Department for Transport. That same month, ACUA Ocean completed the successful test launch of its USV Pioneer from Turnchapel Wharf in Plymouth. The vessel then underwent a three-month programme of sea trials and regulatory checks, including work with Lloyd's Register towards Maritime and Coastguard Agency Workboat Code approvals, ahead of live demonstrations in March 2025. Now a strong team of 20, the past year saw ACUA Ocean grow its team with eight new hires.



HonuWorx takes delivery of its first underwater vehicle



2022 alum

Aberdeen-based HonuWorx is transforming subsea operations with its all-electric uncrewed underwater systems designed to replace traditional vessel-based approaches. For over 40 years, remotely operated vehicles have relied on large crewed fossil fuel-powered ships to reach offshore worksites. HonuWorx's Loggerhead platform offers a step change in reducing emissions, cost and risk by removing the need for surface vessels. Each deployment could cut emissions equivalent to taking 4,000 petrol or diesel cars off the road.

Over the past year, the company has made significant progress. It secured a seven-figure investment led by TRICAPITAL Angels and Scottish Enterprise, with follow-on backing from the UK Innovation and Science Seed Fund. In early 2025, it took delivery of its first underwater vehicle ahead of sea trials for its subsea deployment platform, which promises to unlock a new level of efficiency across the energy and security sectors. Now in the first phase of a £30 million investment programme, HonuWorx is targeting a 20% share of the global market within the next decade.

Opportunities to scale at speed

The TechX Growth programme is available to all accelerator graduates, providing a broad range of support to help scale their ventures. This includes networking events, access to partner facilities and introductions to potential customers and investors. In 2024-25, it has expanded these efforts to give startups even more opportunities to connect with the right people.

ETZ EnergyWorks



NZTC's TechX alumni will benefit from access to ETZ EnergyWorks, the UK's first green energy incubator and scaleup hub, currently under construction in Aberdeen and scheduled to open in late 2025. Strategically located within the 250-hectare Energy Transition Zone in Altens Industrial Estate, this 3,000m² state-of-the-art facility will be the home for low carbon energy sector startups and scale-ups entering or expanding in the energy sector and will empower them to develop products and services, commercialise these and expand into low carbon and green energy markets locally, nationally and internationally. As a delivery partner alongside the National Manufacturing Institute Scotland and founding partners bp and Scottish Enterprise in this exciting venture, NZTC will apply its expertise to support ETZ EnergyWorks' customers in commercialisation, technology development and securing funding to help accelerate their path to market.

TechX alumni will be encouraged to access the hub's, as well as connecting to a broader community of startup peers, operators and supply chain partners, investors, academia and government agencies.

Net Zero Innovators Technology Conference and Exhibition



In 2025, NZTC hosted the inaugural Net Zero Innovators Conference and Exhibition, creating a high-profile platform for the TechX community of startups and alumni to showcase their technologies to operators and the wider supply chain. Held at P&J Live in Aberdeen, the event highlighted the real-world impact of clean energy innovation through startup exhibitions, a live pitch battle and technology demonstrations.

Beyond showcasing innovation, the conference fostered new connections and reinforced the role of early-stage startups in achieving net zero.



100+
startups and
ecosystem
partners exhibited



250+
delegates
attended

Panel discussions with industry leaders explored key themes in decarbonisation and energy transition

Awards and recognition

Innovation recognised and rewarded

Several of the projects we've funded have been recognised for their groundbreaking innovations.



Offshore Achievement Awards: Emerging Technology Award

Puls8 won the Emerging Technology Award at the Offshore Achievement Awards, recognising the unique impact it is making across the industry. Their hand-held Pulse Tooling system enables quick, non-invasive identification of pipes, hoses and tubing, enhancing safety and reducing operational risk across industrial sites. Puls8 was supported by NZTC's TechX Accelerator programme in 2020, after which it secured additional funding from the centre to further develop and test its solution.



SETsquared Community Awards 2024: Clean Superpower: Net Zero Award

Latent Drive were shortlisted for the Net Zero Award for 'SeaStack,' the world's first commercial direct seawater-to-hydrogen electrolyser stack, helping to reduce the cost of green hydrogen. SeaStack is designed to produce green hydrogen offshore without desalination. It's optimised to be coupled to offshore windfarms, coastal solar farms, ports and harbours. Latent Drive was one of the winners of NZTC's Electrolyser Competition,, receiving a share of £500K funding in 2024.



The Northern Star Business Awards: Inspiration from Innovation

Pipetech's Downhole Scale Remediation (DSR) technology was nominated for the Inspiration from Innovation award for its approach to wellbore scale removal, which uses a semi-flexible hose and rotating high-pressure jetting head to clean back to bare metal through challenging downhole diameter changes, supporting production, decommissioning and potentially well re-utilisation for carbon storage (CCS). Pipetech received critical R&D support through NZTC's 2022 Open Innovation Programme.



OWI: Best Example of Subsea Intervention 2024

Axter by Aarbakke Innovation won Best Example of Subsea Innovation for their groundbreaking Retrieve Tool aimed at transforming offshore well plugging and abandonment (P&A) by enabling rig-less operations. By effectively removing downhole permanent gauge cables that pose long-term integrity risks, the Retrieve Tool allows for the tubing to be permanently cemented. This innovative approach eliminates the need for rig-based intervention, significantly reducing costs and enhancing the availability of assets capable of performing P&A operations offshore. This project was funded through NZTC's Well Decommissioning Collaboration and is actively supported through ongoing pilots.





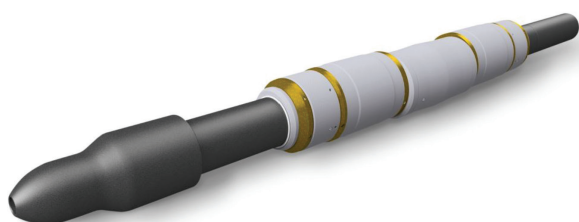
2024 Texas A&M New Venture Competition

Predyct, a finalist and second prize winner at the 2024 Texas A&M New Venture Competition, enables predictive operations for climate-critical assets such as wind farms. Its proprietary NanoX™ system continuously monitors blades and foundations, providing actionable insights for repair prioritisation, maintenance planning and real-time operational efficiency. Predyct received R&D funding from NZTC's 2023 Open Innovation Programme.



King's Award for Enterprise 2024: International Trade

Deep Casing Tools has been awarded the prestigious King's Award for Enterprise in International Trade for their outstanding international trade growth strategy. This Aberdeen-based firm successfully deployed its suite of technologies, including the Rubblizer, across various international projects in 2023. This accolade underscores their remarkable success in expanding their global market presence. By strategically targeting key markets and forging strong partnerships, Deep Casing Tools has not only demonstrated significant growth but also delivered cutting-edge solutions to the oil and gas sector. NZTC has partnered with Deep Casing Tools since 2019, supporting the company with funding, development opportunities and offshore trials.



ONS 2024 Innovation Award

NOV was a finalist for the ONS 2024 Innovation Award for its groundbreaking Subsea Storage technology. This high-tech underwater tank system stores liquids such as e-methanol and production chemicals for offshore operations. Its novel membrane allows variable storage volume at ambient pressure, enabling subsea storage at any location and depth. The system operates autonomously, reducing human intervention, lowering operational costs and enhancing safety, while offering the potential for environmental benefits by enabling localized and efficient offshore storage. NZTC provided funding to accelerate the development and validation of NOV's technology. The project concluded in November 2024.



Oil and Gas Middle East Awards 2025: Innovation of the Year and IET Excellence and Innovation Awards 2024

CorrosionRADAR earned a strong runners-up position for its industry-leading predictive CUI monitoring solution at the Oil and Gas Middle East Awards and was also recognised by The Institution of Engineering and Technology (IET) at the IET Excellence and Innovation Awards 2024. These recognitions highlight their pioneering efforts in the energy sector. By integrating predictive analytics, smart sensors and advanced data-driven risk assessment, CorrosionRADAR predicts when and where CUI will occur. This combination of product, data and expertise allows businesses to make informed decisions, save time and costs and ensure the longevity of critical infrastructure.

NZTC has supported CorrosionRADAR since 2019, through two funding projects which involved technical development, offshore trials and validation to advance its CUI detection technology.



Technology Without Borders

Embedding technology in global decarbonisation strategies

In 2024, NZTC deepened its engagement with global organisations leading the charge toward net zero. Since COP26, when NZTC convened an international summit of energy technology centres, we have consistently advocated for technology innovation as a critical lever in addressing climate change, particularly in hard-to-abate sectors.

While financing the energy transition has dominated recent COP agendas, technology innovation remains a vital and recurring theme. Through active collaboration with policymakers, industry leaders and innovators, we work to ensure that technology's transformative potential is not only recognised but embedded in global decarbonisation strategies.

Partnering with international organisations leading the energy transition

NZTC actively partners with global alliances and taskforces shaping the future of clean energy. In 2024, we strengthened our role as a knowledge partner with IRENA's Alliance for Industry Decarbonization (AFID) and joined the newly launched Utilities for Net Zero Alliance (UNEZA). We also contributed to the Climate Action Global Clean Power Task Force, which brings together leaders committed to accelerating the deployment of clean power technologies.

In 2025 NZTC delivered AFID's Technology Innovation Showcase in collaboration with Euro Mechanical, spotlighting high-TRL technologies in green hydrogen,

bioenergy with carbon capture and storage (CCUS) and circularity of critical materials. These efforts are designed to catalyse pilot projects within AFID's global membership and promote scalable solutions in emerging markets. Through these engagements, NZTC continues to amplify the role of technology in delivering a just and inclusive energy transition.

In 2025, the Technology Without Borders programme will be focused on deepening global partnerships and strengthening its role in international climate forums.

Partnering Organisations

Research and Technology Organisations



International Agencies



Research and academia



Launched in June 2024, the National Geothermal Centre (NGC) is a partnership between NZTC, Durham University and SHIFT Geothermal.

Established to unlock the UK's geothermal potential, the NGC brings together expertise across research, policy and regulation, technology innovation and infrastructure. It acts as a national hub for knowledge exchange, a bridge between industry and academia, and a champion for effective policy and investment frameworks.

The centre supports the transition of existing industries and workforces, while enabling geothermal deployment across multiple sectors, including heat networks, construction, manufacturing and agriculture.

Building the framework for national impact

Since its launch, the centre's primary focus has been the development of a strategic roadmap. This will provide a clear view of the UK's current geothermal landscape, mapped against the key pillars guiding the NGC's work. It sets out the centre's ambitions for 2050 and outlines the technologies, projects and policy frameworks needed to realise them.

“The National Geothermal Centre will shape and accelerate our growing geothermal sector through collaborative cross-sector working.

The centre will ultimately help to unlock geothermal for more people and secure its position as an essential part of our low-carbon energy mix.

Dr Charlotte Adams
CEO, National Geothermal Centre

”

The roadmap will inform a long-term strategy to achieve the centre's national targets*:



50,000
jobs created



10 GW
of the UK's heat
demand supplied



1.5 GW
of electricity delivered



10 Mt
of CO₂ emissions
avoided annually

NGC now leads the National Geothermal Taskforce, convening over **150** representatives from across the UK's geothermal community to drive coordinated development. This includes direct engagement with the Department for Energy Security and Net Zero.

Operating without a physical base, the centre is supported by **four** secondees from the Net Zero Technology Centre, who provide dedicated support across its core workstreams.

*These targets are grounded in the trajectory observed across comparable geothermal markets in mainland Europe.



The National Decommissioning Centre (NDC) is a partnership between NZTC, the University of Aberdeen and the energy industry.

Combining industry expertise with academic excellence, the NDC is working in partnership with the oil and gas, nuclear and renewable energy sectors to lead research and development that helps achieve cost and emissions reductions, improve environmental outcomes and transform approaches to deliver sustainability and net zero decommissioning.

With a total of £10M+ funding to date, NDC continues to deliver.

2024/25 at a glance:



10

completed projects



25

ongoing projects



22

academic publications



21

research staff working on projects



9

PhD studentships and 10 graduated

“ The continued success of the NDC is built on strong global partnerships and the delivery of impactful projects.



At the core is our commitment to advancing sustainable and cost-effective decommissioning that supports the UK energy sector in meeting its targets.

Professor Richard Neilson
Director, NDC

”

Advancing partnerships and policy influence

The continued success of the NDC reflects the strength of its partnerships. The NDC's collaboration with the Nuclear Decommissioning Authority was extended for a further year, with increased focus on artificial intelligence and machine learning. The partnership also supports a range of projects that align with the NDA's wider delivery objectives.

NDC-led research into the socioeconomic impact of decommissioning at local and national levels has helped inform policy. This evidence contributed to the Scottish Government's decision to establish a Cross Party Group on the Civil Nuclear Industry.

Driving innovation and global collaboration

The NDC continues to advance technology development and cross-sector collaboration. A partnership with Claxton led to the successful demonstration of an all-electric underwater laser pile cutting tool in March 2025, with deployment planned in the North Sea in July.

The centre also played a key role in the Data for Net Zero project, which concluded in March 2025, completing its work packages and delivering data-driven tools to support infrastructure repurposing, decarbonisation of decommissioning and improved decision making.

Internationally, the NDC is now part of the newly formed UK-AUS Offshore Decommissioning Working Group. This collaboration follows the signing of a Memorandum of Understanding between the UK and Australia to support joint progress in offshore decommissioning.



The National Subsea Centre (NSC) is a partnership between NZTC, Robert Gordon University (RGU) and industry.

The NSC is a hub for collaboration between industry, academia and government agencies in the fields of subsea engineering and smart technologies to enable a faster, more cost-effective transition to a net zero energy basin.

NSC and SeaSense develop haptic and AI control for subsea precision

Subsea operations face significant challenges where poor visibility and limited sensory feedback constrain remotely operated vehicles, increasing costs, risks and emissions. To address this, the NSC supported SeaSense in developing advanced haptic technology that enables operators to remotely control subsea systems with real-time tactile feedback, enabling more accurate manipulation of infrastructure in harsh underwater conditions.

Continued growth in 2024/25:



11

completed and ongoing projects



20

PhD Students and 6 completions



35+

academic publications

Research and academia



With additional support from NZTC, Robert Gordon University and University of Strathclyde, the project advanced robotic manipulation and control in sensing-denied environments where tactile sensing is essential for accurate perception. SeaSense combined a haptically driven robotic hand, real-time 3D reconstruction of fingertip contact points and AI-driven multimodal feedback to enhance operational accuracy. The system was integrated into a Staubli robotic platform, tested through dry system integration trials using an Oceaneering ROV and validated via NSC-led assessments.

Successfully completed in August 2024, SeaSense demonstrated the potential of remote and autonomous robotic manipulation to improve safety, reduce reliance on human intervention and support lower carbon offshore operations aligned with the North Sea Net Zero Carbon basin vision.

International collaboration advances intelligent mechatronics design

The Linz Centre of Mechatronics GmbH (LCM) in Austria, supported by BMVIT, BMWFJ and the province of Upper Austria and managed by the Austrian Research Promotion Agency (FFG), established the COMET K2 Competence Centre for Symbiotic Mechatronics to drive high-risk innovation at the interface of science and industry.

Working closely with international partners, including the NSC, LCM successfully completed phase 2 in December 2024. Together they refined surrogate-assisted multi-objective evolutionary algorithms (MOEAs) to tackle complex mechatronic design challenges. These algorithms enable efficient optimisation across a wide range of applications.

The collaboration also focused on developing accurate data-driven dynamic motor models, providing valuable insights into operational performance and supporting smarter design and control.

This partnership demonstrates how international expertise accelerates innovation in intelligent mechatronics, delivering tools that improve design efficiency and system reliability.

Technology services

Bringing clarity and confidence to net zero technology adoption

NZTC advises organisations navigating the complex landscape of net zero technologies.

Evolving from the original Technology Services suite launched in 2022, NZTC's offering now includes technology insights, innovation competitions, technology due diligence and collaborative industry programmes, each tailored to the needs of the individual client. These services are shaped by client feedback, market intelligence and performance insights, enabling NZTC to continue to act as a trusted partner in helping clients make informed, future-focused decisions that align with their decarbonisation goals.



Technology Insight

Technology roadmaps, horizon scanning and other technology insights help clients to keep up to date with technology developments, breakthroughs, investments and policies. The right mix of solutions is arrived at through an in-depth consultation process, ensuring insights are tailored to meet the unique needs of each client. Clients use this information to support technology planning and investment decisions.



Competitions

Innovation competitions shortcut the R&D process by working on behalf of clients to scout for the very best of emerging net zero technologies being developed by startups and other innovators globally. Clients may choose whether to trial, pilot, adopt or invest.



Technology Due Diligence

NZTC's technology due diligence service takes the guesswork out of investing in emerging technologies. Our team of experts helps industry, private investors, banks and philanthropists to understand the disruptive potential, path to commercialisation, competitors, risks and investability of new technology.



Collaborative Industry Programmes

NZTC convenes industry peers to address operational challenges through co-development, field trials and testing of technology. Participants share the risks and costs of deploying new technology. These collaborative programmes promote standardisation across the energy sector.



Innovation Hubs & Centres

NZTC advises governments and corporations looking to establish national energy innovation hubs and centres following the NZTC model. This work builds on the success of the NZTC in Aberdeen and its three national centres of excellence – The National Subsea Centre, The National Decommissioning Centre and The National Geothermal Centre. Hubs and centres align the local energy ecosystem around shared challenges and opportunities and generate significant value through match funding.



Acceleration-as-a-Service

Building on the success of NZTC's own startup accelerator, we help clients to design and launch their own hardtech startup accelerators including training, support and funding.



Technology Conferences

NZTC's technology conferences bring together technology developers, investors and industry players to accelerate the adoption of cutting-edge energy technologies. These conferences can run as stand-alone events or as part of industry conferences.

Case study

ADNOC Sulfur Innovation Challenge

Service: Competitions

Client: ADNOC

ADNOC, supported by NZTC, launched a global competition to accelerate the environmentally responsible use of sulphur. The goal was to identify sulphur application technologies in five areas: energy storage, engineered materials, novel chemical solutions, next generation agricultural solutions and environmental and net zero focused solutions.

At ADIPEC 2024, five finalist technology developers pitched for a first prize of up to \$1 million in funding, along with partnership and research opportunities at ADNOC's research facility in Abu Dhabi.



Tata Steel won first place with their novel use of sulphur for steel manufacturing. Sultech came second with their sulphur-based eco-friendly, non-synthetic fertiliser.

Case study

Technology Showcase with IRENA

Service: Technology Insights

Client: Alliance for Industry Decarbonisation (AFID)



In response to the urgent need to decarbonise the industrial sector, AFID and NZTC came together to launch a global innovation competition at COP29 to identify and accelerate the deployment of decarbonisation technologies nearing commercialisation, with a focus on green hydrogen, bioenergy with CCUS and circularity. The three category winners were selected from a global pool of over 30 applicants and had the opportunity to present their technologies at the AFID Technology Innovation Showcase, part of IRENA Innovation Week 2025.

Case study

Emissions Measurement and Monitoring Roadmap with NSTA

Service: Competitions

Client: North Sea Transition Authority (NSTA)

In 2024, NZTC launched The Emissions Measuring and Monitoring Technology Roadmap, developed in partnership with the North Sea Transition Authority (NSTA). While the oil and gas sector is on track to meet interim North Sea Transition Deal (NSTD) emission reduction targets, further measures are needed to achieve the goal of halving production emissions by 2030. The roadmap serves as a comprehensive resource hub for identifying technologies to measure and monitor emissions from power generation, flaring and venting. It provides North Sea operators with data and insights on current and emerging emissions reduction technologies.

Developed in collaboration with industry, the roadmap includes more than 45 technologies, ranging from in-situ sensors and handheld instruments to drones, planes and satellites. The information provided on each technology includes deployment method, sensor classification and measurement frequency.



**Download
the Emission
Measurement
and Monitoring
Technology
Roadmap report**



“ This project has an important role to play in defining the roadmap for the adoption, across the UKCS, of the best and most up-to-date technologies in emissions measurement.

This will improve the quality of the data that NSTA uses in assessing Operators progress towards achieving the GHG emissions reduction targets set out in the North Sea Transition Deal.

In addition, some of the technologies showcased allow GHG emissions to be modelled in real time; this can play a key role in helping operators to manage and minimise these emissions.

Doug Griffin
Measurement and Allocation Manager,
NSTA

Sustainability

Driving net zero inside and out

At NZTC, we are committed to sustainability, which we aim to achieve in our own operations and by supporting our clients to meet their net zero goals.

We track our progress against the UN Sustainable Development Goals (SDGs).

NZTC's own operations contribute to nine SDGs and our technology advisory services contribute to four SDGs. The greatest external area of impact is on SDG 7 Affordable & Clean Energy and SDG 13 Climate Action.

NZTC is focused on responsible consumption and production, particularly measuring and monitoring its own emissions.

NZTC's emissions in FY25 were 244 tonnes CO₂e, an increase of 55% on FY24. This was driven by a 90% rise in business travel emissions over the time period as NZTC expanded its Technology Services advisory offering further, which led to increased business travel, and in particularly more international business travel. The number of long-haul flights taken by NZTC increased by 85% compared to FY23, which resulted in a significant emissions increase.

Staff also commuted to the office more frequently in FY24 than in FY23, which meant commuting-related emissions also rose marginally, and there was also a small increase in gas emissions.

In February 2025, NZTC switched to a renewable electricity tariff for its second office building, resulting in a small reduction in electricity emissions when compared to FY23. Going forward, this change will have a further positive effect on our emissions because NZTC is now buying only renewable electricity.

How we contribute to the UN's SDGs through our advisory services for our clients



How we contribute to the UN's SDGs through our own operations



In FY24, NZTC:



Arranged for an Energy Efficiency Assessment for both office buildings to be carried out by Business Energy Scotland, to see if any improvements could be made to the building. Recommendations from the assessment included installation of an air source heat pump, and upgrading the windows in our second office building to double glazing. As NZTC rents the building, we are limited as to the changes we are able to make.



Reviewed electric vehicle charger usage to establish if the current number of chargers was sufficient and determined that it was.



Received actual waste reports for the waste uplifted from our offices during the period 2020 to 2024, which allowed us to calculate our waste emissions using actual values, rather than using estimates.



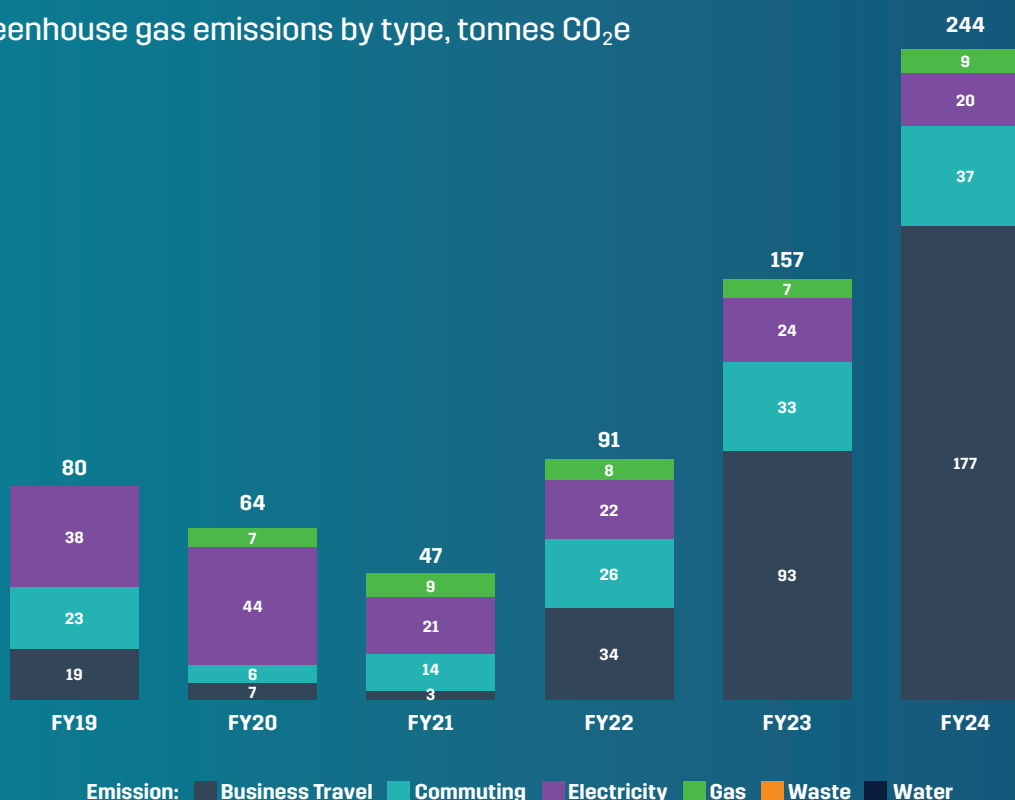
Switched to a renewable electricity tariff for its second office building, meaning both buildings are now powered by renewable electricity.



Reviewed carbon offsetting options and determined that carbon offsetting is not an appropriate solution for NZTC at this time.

In March 2025 NZTC set a new emissions reduction target, which is to reduce our Scope 1 and 2 greenhouse gas emissions by 50% by FY29, on a FY19 baseline.

NZTC greenhouse gas emissions by type, tonnes CO₂e



- Emissions from water usage from FY20 to FY24 are negligible. For example, they were 0.06tCO₂e in FY24.
- Waste emissions from FY20 to FY24 are also negligible. For example, they were 0.01tCO₂e in FY24.
- Please note that waste emissions during the period FY19 to FY23 have been re-stated. They have been revised down from 14tCO₂e to 0.01tCO₂e in FY19, 4tCO₂e to 0.03tCO₂e in FY20, 6tCO₂e to 0.03tCO₂e in FY21, 10tCO₂e to 0.05tCO₂e in FY22, and 6tCO₂e to 0.04tCO₂e in FY23.
- Please also note that the figure for business travel in FY23 has been re-stated. It has been revised up from 88tCO₂e to 93tCO₂e in FY23 due to our travel provider correcting an error in their calculations.
- Total emissions have therefore been re-stated from 94tCO₂e to 80tCO₂e in FY19, 68tCO₂e to 64tCO₂e in FY20, 53tCO₂e to 47tCO₂e in FY21, 101tCO₂e to 91tCO₂e in FY22, and 158tCO₂e to 157tCO₂e in FY23.
- Figures may not sum to totals due to rounding

Source: NZTC

Diversity, inclusion and equality

Our commitment to creating a culture of inclusivity

At the Net Zero Technology Centre, we believe that diversity and inclusion are essential to innovation and impact. We are committed to inclusivity across all our programmes, championing gender diversity in the energy transition. We actively support diverse founders and teams, ensuring that the clean energy future is shaped by a broad spectrum of voices and experiences.

Promoting gender diversity in STEM

We actively encourage and support women to pursue education and careers in STEM fields, helping to build a more balanced talent pipeline for the future.

Transparent and fair pay practices

We conduct annual salary audits and job evaluations to ensure equal pay for equal work. Salaries are benchmarked using independent tools and reviewed by HR to avoid bias. While we don't publish salaries in job adverts, we maintain internal transparency to reduce discrepancies.

Flexible and inclusive work arrangements

We offer flexible hours and remote working options to support employees with diverse needs, including those with caregiving responsibilities. These arrangements help foster work-life balance and retention.

Removing bias from recruitment and progression

All job adverts are reviewed for gendered language. Hiring decisions are made using structured, benchmarked criteria. Managerial discretion over starting salaries is limited to reduce the risk of unequal pay.



Inclusive culture and leadership commitment

Our Diversity, Inclusion & Equality policy is supported by senior leadership and embedded across the organisation. We mark events like International Women's Day and provide regular training on unconscious bias and inclusive leadership.

Policy review and data-driven action

We regularly review and update our policies to ensure they are inclusive. Gender-disaggregated data is collected and analysed to identify gaps and inform improvements.

Inspiring the next generation

Bridging industry and innovation

We collaborate with our industry partners, regional organisations, schools and universities to showcase the exciting opportunities available in the energy industry. By providing valuable insights into the real world of work, we aim to inspire the next generation of innovators.

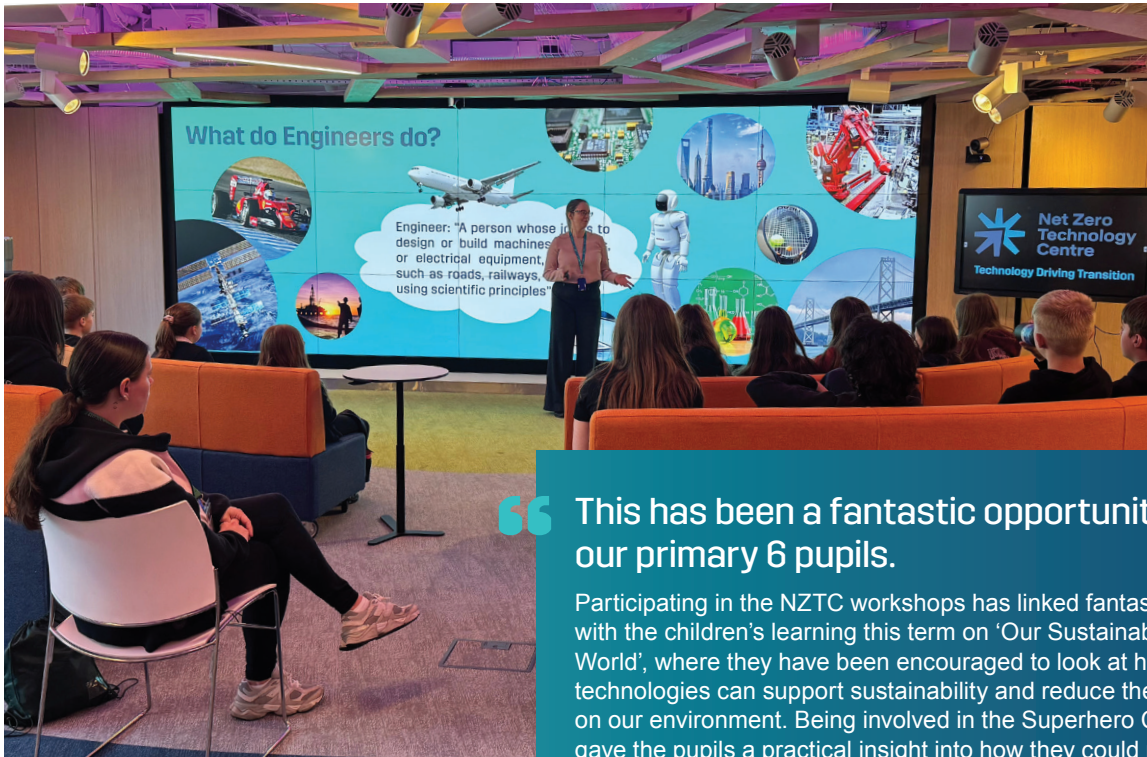


Sparkling passion in schools

We strengthen the relationship between the engineering industry and local schools by hosting STEM activity days and supporting programmes such as Career Ready Scotland. Our goal is to foster lasting relationships that inspire young minds to explore possibilities in STEM.

From education to impact

NZTC is committed to nurturing talent and providing career opportunities by actively hiring and offering graduate roles to those who demonstrate exceptional skills and potential through our programmes.



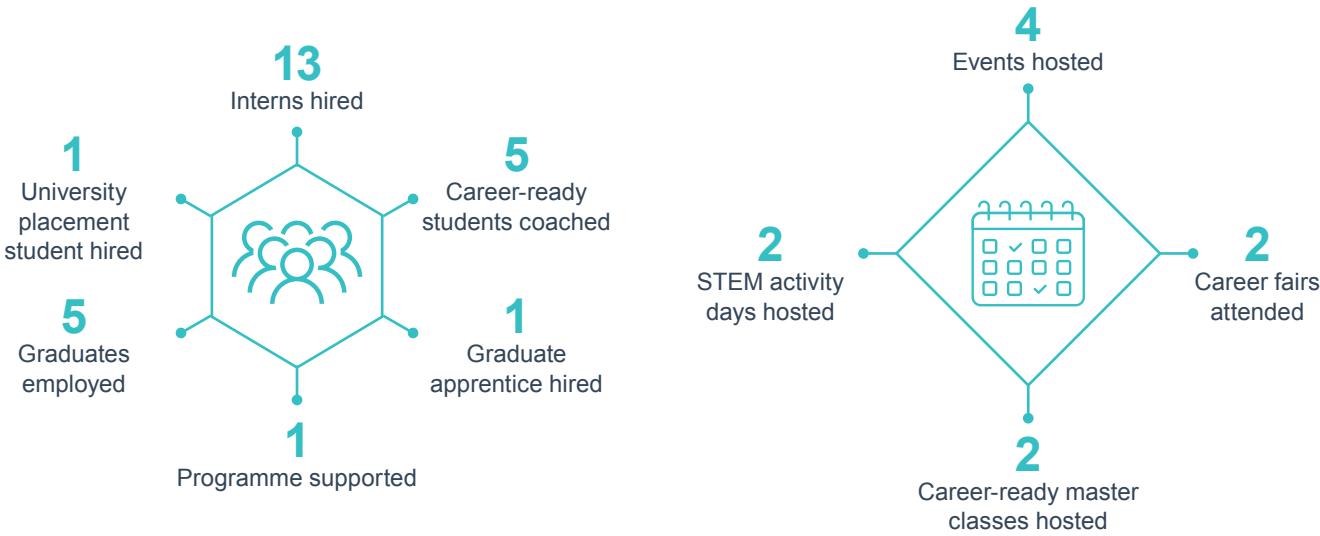
This has been a fantastic opportunity for our primary 6 pupils.

Participating in the NZTC workshops has linked fantastically with the children's learning this term on 'Our Sustainable World', where they have been encouraged to look at how technologies can support sustainability and reduce the impact on our environment. Being involved in the Superhero Challenge gave the pupils a practical insight into how they could make an impact in their own school. It has also been a great opportunity to discover more about the types of careers and opportunities there could be for them in the world of work!

Elaine Sykes
Principal Teacher, Mile End Primary School



How we inspired the next generation in FY24



Hear from some of the young people we've inspired



“

My summer internship on HOP2 was an invaluable experience.

The project allowed me to deepen my understanding of hydrogen, while also developing skills such as GIS and contributing to a real industry project. It was a great opportunity to meet and learn from passionate professionals within the field. Having not worked in industry before, the internship provided the perfect stepping stone to my current role as a net zero graduate at NZTC.

Jennifer Rickets, recent graduate

“

My internship at NZTC was a unique opportunity to apply my computing skills to a real-world project.

It gave me a strong sense of purpose and a deeper insight into how emerging technologies can support progress towards a more sustainable future.

Atanas Komsiyski, recent graduate

”

Financial and governance

Our Board

Chaired by Peter Mather, our Board is responsible for the overall strategic direction and long-term success of NZTC. Our Board makes 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, Myrtle Dawes, who in turn delegates responsibility for specific activities to members of the leadership team.

Meet the board



Peter Mather
Board Chair
and Nomination
Committee Chair



Myrtle Dawes
Chief Executive
Officer



Jeff Coray
Senior Independent
Director



Liz Ditchburn
Audit Committee
Chair



Alex Reip
Non-Executive
Director



Karin Hagemann
Non-Executive
Director



Sarim Sheikh
Non-Executive
Director



Sian Lloyd Rees
Non-Executive
Director



Kevin Reynard
Non-Executive
Director

In December 2024, Kevin was appointed to the NZTC board as a non-executive director. He brings to the role more than 35 years of experience as a Chartered Accountant for PricewaterhouseCoopers, serving clients in oil and gas, power, renewables and more.

Our Nomination Committee

Chaired by Peter Mather, our Nomination Committee reviews the structure, size and composition of the Net Zero Technology Centre Board to ensure the Board is appropriately represented in terms of skills, knowledge, experience and diversity.

The Nomination Committee also works with the executive leadership team to ensure a robust succession plan for the executive is in place. The Nomination Committee will also ensure appropriate representation on other Board related committees and Panels.

Our Audit Committee

Chaired by Liz Ditchburn, 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).

Our financial position

	31 March 2024	31 March 2025
Net Zero Technology Centre Limited Group £'000	£'000	£'000
Non-current assets		
Intangible assets	375	161
Tangible assets	670	490
Deferred tax assets	24	24
Current assets		
Trade & Other debtors	5,992	7,707
Investments	400	870
Cash at bank	13,491	11,816
Creditors: amounts falling due within one year	(21,136)	(20,995)
Net current liabilities	(1,253)	(602)
Total assets less current liabilities		
Deferred tax liability	0	0
Net assets	(184)	73
Reserves	(184)	73

Note, FY24's numbers have been updated from last year's annual review to reflect the outcomes of the latest audit. FY25 numbers are provisional and have yet to be audited.



About the Net Zero Technology Centre

The Net Zero Technology Centre (NZTC) is a not-for-profit organisation working with industry, government and academia, driving technology innovation to accelerate the transition to net zero. NZTC was created in 2016 as part of the Aberdeen City Region Deal, with £180 million of UK and Scottish government funding to maximise the potential of the North Sea.



Funded by
UK Government

and



Scottish Government
Riaghaltas na h-Alba
gov.scot



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Technology Driving Transition

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