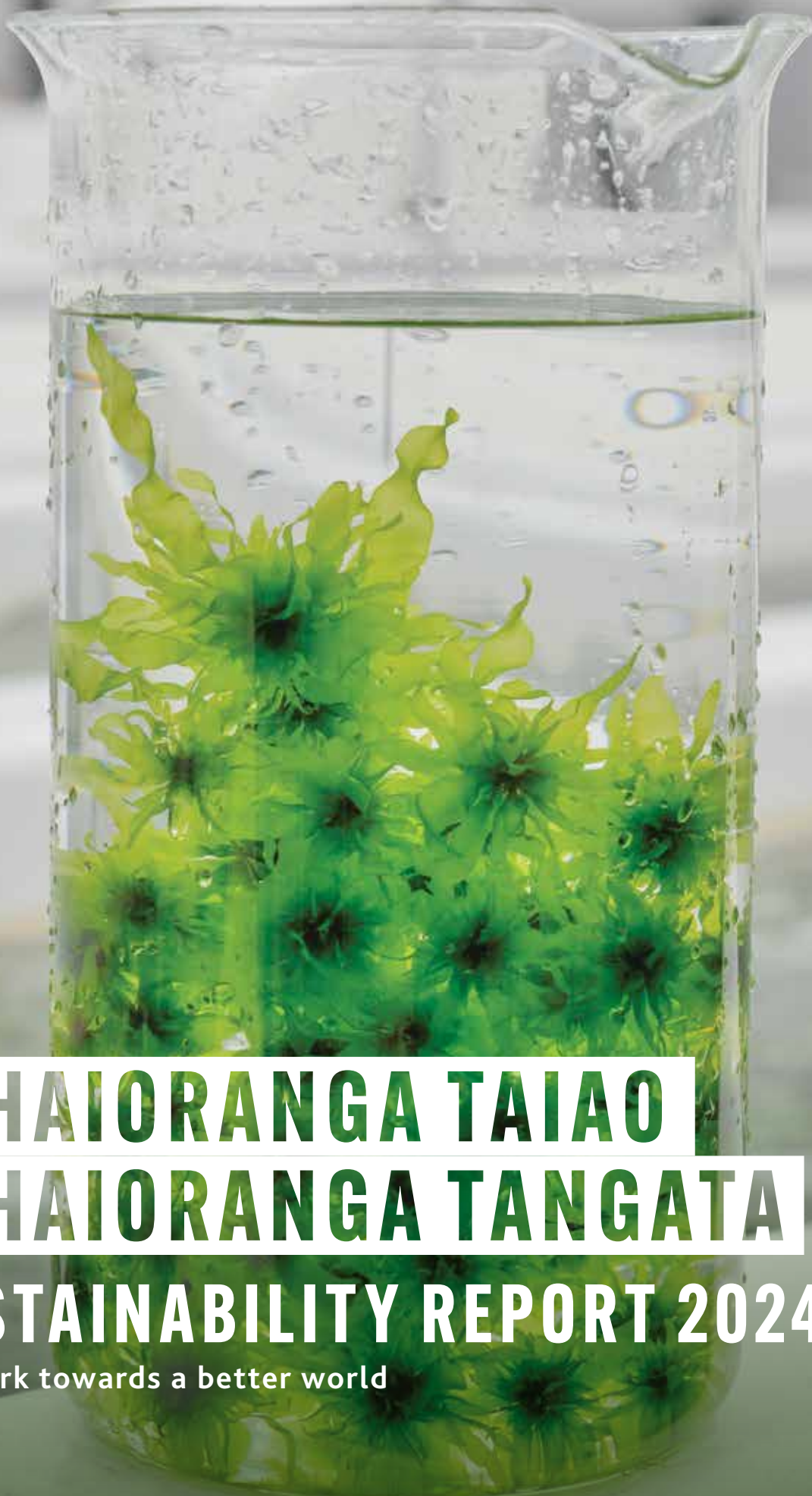




THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato



WHAIORANGA TAI AO
WHAIORANGA TANGATA
SUSTAINABILITY REPORT 2024
Our work towards a better world

Ulva stenophylloides, a type of green seaweed being farmed by the University of Waikato team, in a beaker at the University of Waikato Macroalgae Research Facility.

Photo credit: Tomek Friedrich (Artzentao Photography). Photo courtesy of AgriSea.



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certified paper,
supporting the
growth of responsible
forest management
worldwide

Whaioranga Taiao, Whaioranga Tangata is a record and a celebration of our interconnected work at the University of Waikato to build inclusive and equitable communities, and a thriving and healthy environment. This report demonstrates our commitment to the United Nations' 17 Sustainable Development Goals (SDGs).

waikato.ac.nz/sustainabilityreport

Contents

A message from the Vice-Chancellor	4
From the Deputy Vice-Chancellor Research	5
Our sustainability vision	6
Our University at a glance	7
Sustainability on campus	8
By the people, for the people	10
Unveiling the influence of Antarctica	12
Supporting society to be resilient to natural hazards and climate change	14
Sustainable innovation for people, business and the environment	16
Improving outcomes by targeting healthcare access and equity	18
Protecting and restoring our oceans and waterways	20
Building evidence to support sustainable trade	22
Index	24



A message from the Vice-Chancellor



Our 2024 Sustainability Report outlines our proudest achievements in research and campus operations in pursuit of the United Nations' 17 Sustainable Development Goals.

Working alongside the people, businesses and communities we serve, the University of Waikato is delivering work that transforms, is multidimensional and encompasses economic, societal and environmental benefits. We see the tangible differences our research is making in communities as a real measure of our success.

At the core of this work are relationships and our commitment to the communities and people our research serves. Our research is being developed alongside our stakeholders to ensure its relevance, and we are also adopting more agile research models, allowing for phased outputs and incremental actionable insights.

At the same time, on campus we are continuing to implement our Carbon Reduction Plan 2022-2025. Initiatives such as the shift from a petrol-based fleet of University vehicles to a predominantly electric vehicle (EV) fleet and the installation of solar arrays

across the Hamilton campus are positively impacting energy savings.

My colleagues Professor Gary Wilson, Deputy Vice-Chancellor Research, and Dr Joe Ulatowski, our newly appointed Assistant Vice-Chancellor Sustainability, have the responsibility for continuing to build on our sustainability success by raising awareness of our commitment to sustainability, developing new initiatives toward these goals and building our sustainability research profile.

With our QS Sustainability Ranking of 112 in 2025, and a ranking in the top 200 universities in the 2024 Times Higher Education (THE) Impact Ranking, we are committed to helping address some of the world's most pressing issues and are pleased to have our efforts recognised.

Professor Neil Quigley
Vice-Chancellor

From the Deputy Vice-Chancellor Research

Developing the tools for a more sustainable future is now more important than ever, from understanding how to manage rapidly changing environments to reducing the footprint of human settlement, industry and recreation.

The basis for a sustainable future is knowledge – knowledge of the impacts of our activities, knowledge of the changing environment and climate, and knowledge of how to develop less impactful materials and practices.

Here at the University of Waikato, our research spans all of those aspects. We see sustainability as not simply a discipline to be studied and taught, but something that underpins all that we do.

We rely heavily on our partnership with Māori and Pacific people, and their multigenerational understanding of our environment, not only to drive our research, but in how we use the old and new knowledge we are generating to drive better outcomes across our institution, across the region and across the globe.

Our research tackles some of the most challenging aspects of sustainability – remoteness, inequity and economy. Each of these topics was discussed at TEDxUniversity of Waikato, our 60th anniversary

TEDx event, along with how we might use artificial intelligence and Indigenous approaches to business to address them.

Much of our research recognises the need to engage the wider community in the issues, approaches and solutions. Some of the impacts of climate change are being felt close to home and impacting local society, but much of it is not.

Engaging with society allows us to build those greater linkages to not only understand the connections but also what, in our individual lifestyles, we can do about it.

The what we do about it is also difficult. But, here too, we are providing new approaches, materials and management tools that are not only reducing the cost of becoming more sustainable across society but making sustainable choices also the more cost-effective options. In health, we are working to reduce the need for treatment by engaging early with society to generate better and more sustainable health and wellbeing outcomes.

As an island nation with a small population, sustainable options are difficult with significant transport cost both in the supply chain and for our engagement with the wider world.

But through our own research we are learning where we can best tackle the impacts of our activities and reduce our institutional footprint, while ensuring we are continuing to be world leading in the research we undertake, the programmes we teach and the knowledge we share.

Through this, we are not only treading more lightly but also providing world-leading knowledge and scalable solutions that are enabling others to change their approach.

Professor Gary Wilson
Deputy Vice-Chancellor Research



Our sustainability vision

The Māori concept of Kaitiakitanga instils a deep sense of connection to the land and a commitment to ensure its health and vitality for future generations. Kaitiakitanga is the cornerstone of sustainability at the University of Waikato.

Sustainability is an assurance that what we do now and how we do what we do does not impair the ability of future generations to depend on the environmental benefits that are available today.

The University's Sustainability Report describes the ecologically sound, socially just and financially prudent actions that have been characteristic of our leadership in the sustainability space. The report shows how our scholars and educators have improved people's wellbeing and the environment, and positions the University as a local and global collaborator and leader. Also, the ambitious actions of our property management team have led to a substantive reduction of greenhouse gas emissions, to a minimisation of our carbon footprint, and positive changes in our facilities and infrastructure to confront issues of climate resilience.

Sustainability efforts for decades have been based on the notion that we simply must "do better", but moving forward our labour must fit a new climate paradigm. We should concentrate on the actual impact we can make to reduce greenhouse gas emissions, nutrient pollution, human health effects, water quality impacts and biodiversity loss. We also must recognise that there is no shortage of work to be done. We are focused on meeting ambitious but attainable targets, with metrics against which to measure our progress.

Our research, teaching and operations will continue to incorporate sustainability solutions as a

fundamental component of fulfilling the University's strategic priorities.

Serving these strategies will involve the development of a sustainability action plan with six focus areas:

- **Culture and Engagement for Sustainability:** Embrace diverse perspectives to cultivate environmental stewardship and weave sustainable practices into all aspects of the University.
- **Health and Wellbeing for Sustainability:** Provide healthy programmes and purposeful landscapes and building designs to improve the health and wellbeing of members of the University community.
- **Teaching and Learning for Sustainability:** Prioritise education and learning opportunities that encourage students to confront the challenges of climate change by living differently, using materials differently and disposing of things differently than we have in the past.
- **Research for Sustainability:** Conduct research at the leading edge of building knowledge, initiating the necessary changes, to make the world a more hospitable place.
- **Environmental Stewardship for Sustainability:** Enhance the University's operational efficiencies by continuing to seek out and embrace new ways to care for its buildings and land.
- **Leadership and Governance for Sustainability:** Demonstrate leadership by supporting innovative solutions that yield long-term positive change in sustainability, and serve as a model sustainable campus in tertiary education.

A more sustainable University will be achieved through the preparation of students to lead purposeful lives and contribute solutions to complex problems. Our greatest asset in our effort to mitigate climate change is the commitment of members of the University community.

I thank our students, staff, leaders and friends for your dedication to building a sustainable future.

Dr Joe Ulatowski
Assistant Vice-Chancellor Sustainability



Our University at a glance

Domestic Equivalent
Full-Time Students
(EFTS)

8,692

International
Equivalent Full-Time
Students (EFTS)
(1,807 onshore, 903 offshore)

2,710

26%

of domestic EFTS
generated by Māori
students

39%

of professors
identify as female

\$308m

value of active
research projects

Sustainability on campus

The University has made significant progress with respect to our goals to minimise carbon emissions. Emissions across our operations have decreased by 34% from 2019 to 2024.

In our Carbon Reduction Plan 2022-2025 we identified three areas of focus for reducing our infrastructural carbon footprint:

- examining and optimising building utilisation and processes
- minimising energy consumption and demand through energy efficiency and load management improvements
- assessing fuel switching and alternative energy supply opportunities.

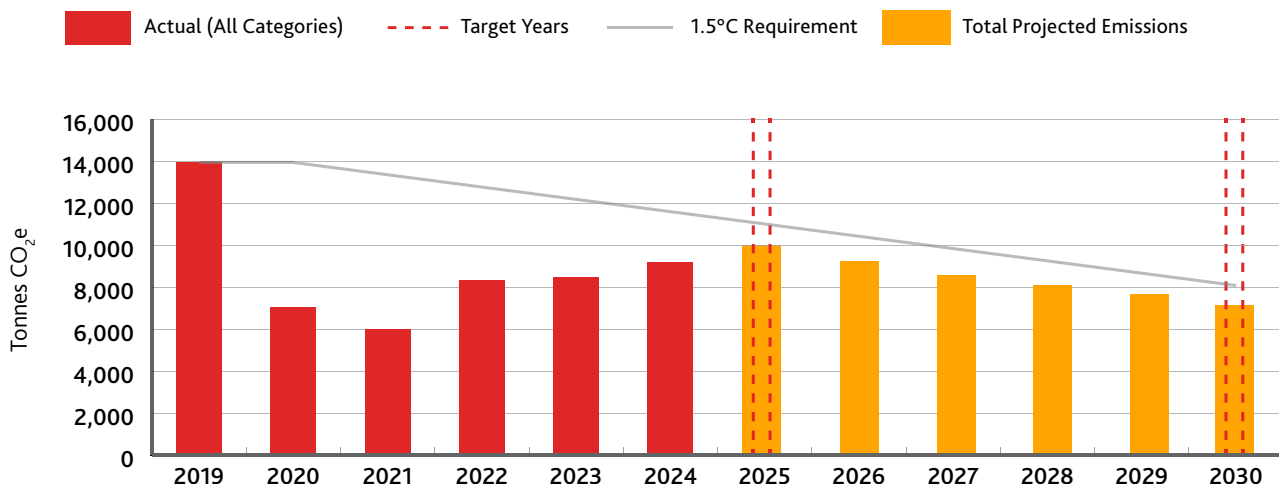
Through these initiatives we expect to have reduced our Scope 1 and 2 emissions by 589 tonnes.

New Zealand is one of the few countries in the world whose electricity grid is primarily powered by renewable energy sources. On top of that, in 2022 and 2023 the University shifted from incandescent to LED lighting, replaced boilers and radiant heaters, and added solar arrays to several of our most costly buildings at our Hamilton campus. Because of this, emissions from energy purchased through electricity retailers decreased by 580 tonnes (134% of our projected 2025 target).

Since the rollout of our new EV fleet in late 2023, we are ahead of schedule and have seen a 113 tonne reduction in our petrol fuel emissions (73% of our projected 2025 target). The ambitious fleet upgrade to 80 EVs – begun by our Chief Operating Officer Jim Mercer and the previous Assistant Vice-Chancellor Sustainability Professor Lynda Johnston, and generously co-funded by the Energy Efficiency and Conservation Authority (EECA) – significantly decreased our reliance upon fossil fuel.

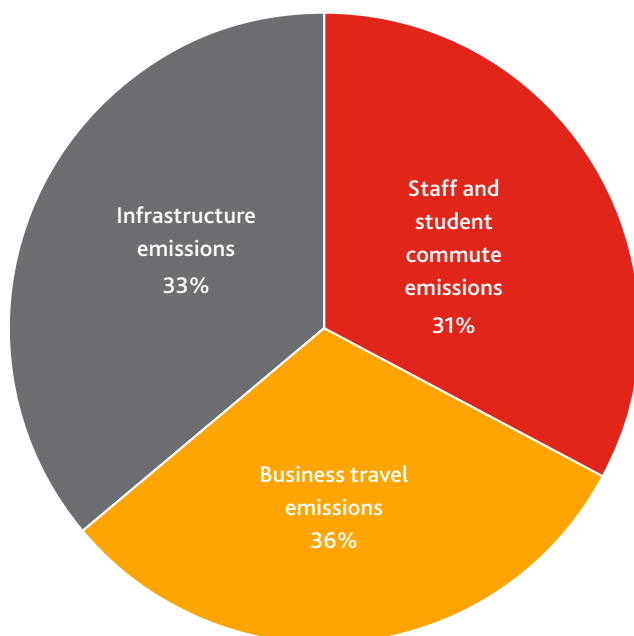
Emissions from student and staff commutes have been difficult to manage through successive Covid-19 national lockdowns as we were unable to establish reliable commute patterns. In fact, commute emissions have increased year-on-year from 2020 and we have not been able to establish a baseline. For 2025, we need to work together to move away from our reliance on petrol vehicles and solo-commuting to-and-from our campuses in Hamilton and Tauranga, and increase our use of public or alternative low-carbon emission means of transport.

Absolute GHG Emissions (All Categories)



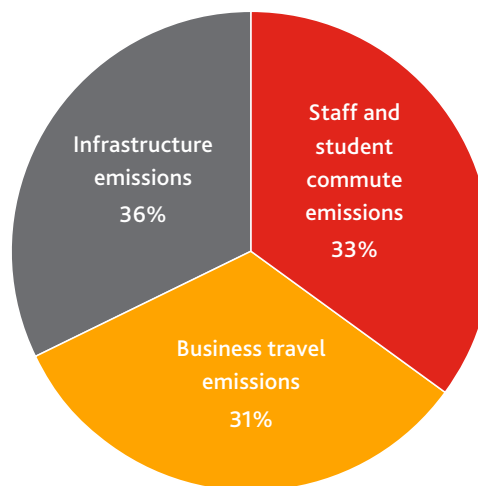
2019 total operational emissions: 13,956 tonnes

Source of emissions
Comparison of commute, travel and infrastructure emissions



2024 total operational emissions: 9,232 tonnes

Source of emissions
Comparison of commute, travel and infrastructure emissions

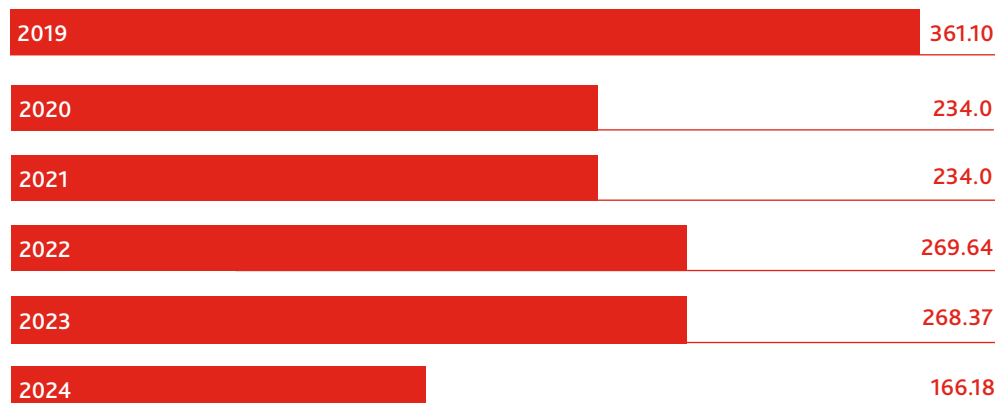


34%



**Reduction in total
operational emissions**
(from 2019 to 2024)

Fuel by Year (Tonnes CO2-e)

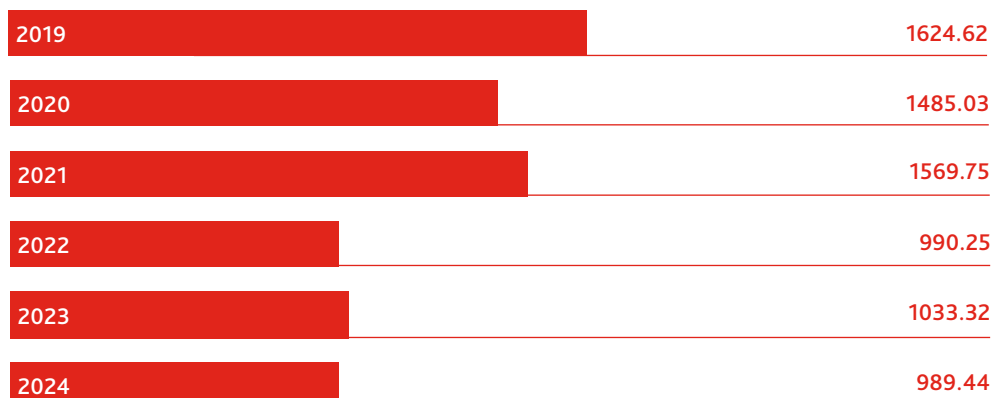


54%



**Reduction
in fuel**
(against a 2019
baseline)

Purchased Energy (Electricity) by Year (Tonnes CO2-e)



39%



**Reduction in
purchased
energy
(Electricity)**
(against a 2019
baseline)

By the people, for the people

In 2024 the University of Waikato marked 60 years since a pioneering group of regional and national leaders seized the opportunity to build a uniquely New Zealand model of university education in Hamilton city.

Founded by the community, for the community, and opened in 1964, the University carries a rich legacy full of remarkable achievements that have shaped us into the institution we are today.

Over the course of 2024 we marked our 60 years with a series of events involving the wider University community, celebrating the past while also looking to our future with the same optimism and determination of our founders.

The University hosted a 60th Anniversary Dinner in September at which the University's biennial Distinguished Alumni Awards were held, providing an opportunity to mark our anniversary while honouring outstanding alumni. University leaders, alumni, and business and civic leaders gathered to celebrate the University's achievements over the past 60 years.

Our researchers discussed how they're tackling some of the world's most challenging issues at our first-ever TEDx event, which brought key stakeholders together at the Gallagher Academy of Performing Arts to hear from speakers of various disciplines.

Dr Jesse Whitehead discussed the integration of people and place in health research while Dr Amanda Williamson explored how artificial intelligence is poised to transform our work environments. Dr Luke Harrington discussed how bridging the science of climate change with existing patterns of extreme weather can better prepare New Zealanders for ongoing challenges and Professor Jason Mika (Tūhoe, Ngāti Awa, Whakatōhea, Ngāti Kahungunu) spoke about the concept and practice of reciprocity, focusing on how Indigenous values can help change the way we achieve sustainability and wellbeing. Dr Marie Magnusson shared how New Zealand's seaweed industry could boost plants' natural defences against a variety of pathogens, and Professor Iain White contemplated ongoing research challenges and how policy, funding and research are intertwined.

Staff came together at events held at our Hamilton and Tauranga campuses to reflect on the journey over six decades that has seen the University grow to become a globally connected institution for teaching, learning and research with established campuses in Hamilton, Tauranga, China and Vietnam.

Also in 2024, the University marked the passing of Kīngi Tūheitia Pōtatau Te Wherowhero VII, a significant loss for the Kīngitanga and New Zealand. His leadership and vision leave a legacy that continues to shape the University's kaupapa and our engagement with mātauranga Māori.

The University has a deep and enduring relationship with the Kīngitanga which is central to our identity.

The Hamilton campus sits on land once inhabited by Waikato-Tainui and returned to the tribe in 1995, vested in the name of the first Māori King, Pōtatau Te Wherowhero.

University Council members, staff, students and alumni joined the thousands who gathered at Tūrangawaewae Marae to pay their respects to Kīngi Tūheitia. The University pouwhenua, which was gifted by King Korokī to mark the University's opening in 1964, was presented as a symbol of the enduring relationship and support given to the University.

Kīngi Tūheitia contributed significantly to the University over his 18-year reign, both through his nominated representative on the University Council and through direct engagement with the University, including the construction and opening of The Pā and the naming of the wharehau Ko Te Tangata. In 2016, the University of Waikato conferred an Honorary Doctorate on Kīngi Tūheitia.

Continuing this legacy, the University's commitment to embedding Māori perspectives and values at our core remains integral to our vision for the future.



Clockwise from bottom left: The University Library was gifted the new name Te Iho o Te Manawataki, brought to life through an unveiling ceremony on Kingitanga Day, 12 September 2024. Staff gathered at the Hamilton and Tauranga campuses to celebrate the University's 60th anniversary. TEDxUniversity of Waikato brought 100 guests together to celebrate the University's anniversary and hear a range of academics speaking on some of the world's most pressing issues. Left to right: Professor Gary Wilson, Professor Jason Mika, Dr Amanda Williamson, Professor Iain White, Dr Marie Magnusson, Dr Luke Harrington, Dr Jesse Whitehead.

The University extends our support to Te Arikiniui Kuini Nga wai hono i te po Pōtatau Te Wherowhero VIII, and her work to continue her father's vision for the future.

As we look to the future, our focus will always be on responding to the needs of our community and contributing to the educational, social, cultural and environmental development of our region and New Zealand.

Our international rankings reflect the impact our research is having. We are placed 235th in the world and are first in New Zealand for Research (measured by citations per faculty member) in the 2025 QS Rankings, and 44th equal globally for Environmental Impact in the 2025 QS Sustainability Rankings – both released in 2024. We ranked in the 101-200 band in the Times Higher Education Impact Rankings released in 2024.

Unveiling the influence of Antarctica

University of Waikato researchers are giving a voice to our planet by using the language of science to reveal the critical role that Antarctica plays in shaping our climate. Their findings will help humanity adapt to an undeniably warmer and increasingly inhospitable world.

As geopolitical shifts drive tension between scientific recommendations on climate change and climate action, our work highlights Antarctica's central role in influencing global climate patterns. Antarctica's ice sheets and glaciers contain 60% of the world's fresh water. Changes in ice sheets drive changes in ocean circulation and, in turn, the global ecosystems which sustain our global food chain.

For nearly 60 years the University of Waikato has led research in Antarctica. We are home to the International Centre for Terrestrial Antarctic Research (ICTAR) that provides interdisciplinary science underpinning the conservation, protection and the management of terrestrial ecosystems in the Ross Sea region. Our Deputy Vice-Chancellor Research Professor Gary Wilson is also the President of the Scientific Committee on Antarctic Research (SCAR), the body responsible for promoting international collaboration and coordinating internationally significant scientific research in Antarctica and the Southern Ocean.

Our researchers have been internationally recognised for their outstanding contributions to the knowledge, conservation and environmental protection of Antarctica. Emeritus Professor Allan Green for his work on Antarctica's terrestrial biota, Professor Ian Hawes for his work on Antarctica's

lakes and Research Fellow Megan Balks for her contributions on Antarctica's soils have all received the New Zealand Antarctic Medal, awarded by the Governor-General for a significant contribution to scientific work on the frozen continent.

This year we also acknowledge Professor Craig Cary who dedicated more than 40 years to the study of microbial life in extreme environments of the deep oceans and Antarctica. The New Zealand and international Antarctic scientific communities mourned Professor Cary's passing in 2024. Among his many legacies is the development of the HAUWAI, a device to be placed on the seafloor of Antarctica, outside Scott Base, that will measure the impact changing sea ice has on Antarctica's marine organisms year-round, allowing researchers to explore Antarctica's depths beyond the traditional summer research window.

Professor Cary was a pioneer who expanded the frontiers of the world's knowledge of the fundamental building blocks of Earth's biological systems. We are committed to carrying on his legacy by encouraging the next generation to take up and expand on Professor Cary's groundbreaking work.



2024 HIGHLIGHTS

From Antarctica's Dry Valleys to Mt Erebus and the thousands of years' worth of data contained within its frozen depths, our research helps us to appreciate how Antarctica's ecosystems adapt and survive temperature extremes, how those ecosystems are changing as our world warms and, ultimately, how we can protect them and use the data we find to inform our own climate resilience strategies.

The Dry Valleys to Mt Erebus

We examined the unique ecological role of lake-edge moats in Antarctica's McMurdo Dry Valleys to uncover how the moats support biodiversity and biological processes in the extreme and nutrient-limited environment. We have also explored the microbial diversity and functional potential of benthic microbial mats in Lake Vanda, a perennially ice-covered lake in the Dry Valleys. These mats are multi-layered sheets of microorganisms that grow on the lake's bottom. Both studies offer insights into the resilience and adaptation of life in extreme environments.

In the geothermal environment of Mt Erebus, the southernmost active volcano in the world, we uncovered novel and previously unclassified microbial life. These microbes have developed mechanisms to thrive in the extreme conditions of high heat, low nutrients, and volcanic gas. Our findings also suggest the potential human impacts on these remote, highly significant sites.



Antarctica's groundwater – an emerging story

Global warming has prompted widespread permafrost thawing, resulting in increased greenhouse gas release into the atmosphere. Permafrost covers up to 18% of Earth, and Antarctica's Dry Valleys, including Taylor Valley, offer a prime location to study its structure, composition and underlying groundwater system. By analysing and mapping groundwater movement through the permafrost in Taylor Valley, our collaborative research aids in predicting climate change impacts and advancing the global understanding of permafrost systems.

Protecting the frozen continent

We examined the presence, sources and impacts of persistent organic pollutants (POPs) in Antarctica's marine ecosystems. These pollutants, including industrial chemicals and pesticides, are transported to the region via long-range oceanic pathways. We also looked at how warming temperatures and melting ice are releasing the stored pollutants, potentially increasing their bioavailability and ecological impact. This collaborative research supports Antarctic protection and evaluates the effectiveness of international agreements including the Stockholm Convention, in reducing POPs.

Supporting the next generation

The Sir Peter Blake Trust in partnership with Antarctica New Zealand and the University of Waikato are safeguarding the future of research in the Antarctic environment by building capability and understanding in young New Zealanders. Each year a BLAKE Antarctic Ambassador works alongside teams of scientists in Antarctica, using their experience to inspire and educate others. In 2024 Caitlin Berquist, an undergraduate student from the University of Waikato, was selected from a national applicant pool as the 2024 BLAKE Antarctic Ambassador and is taking up the mantle as we continue to use science to speak for our planet.



Supporting society to be resilient to natural hazards and climate change

Climate change impacts all facets of the way society interacts with the environment, especially how and when to use space and resources wisely. Environmental planning researchers at the University of Waikato have multiple ongoing projects to help towns and cities grow sustainably, be more resilient to adverse weather and natural disasters, and adapt to climate change.

The team reaches beyond the boundary of the University to conduct projects in collaboration with end users to generate immediate real-world impact. Our University's researchers work alongside engineers and modellers to translate data and to apply it to policy and decisions concerning how we grow while protecting what we value and avoiding transferring risk to future generations.

The changing climate is affecting lives, livelihoods and ecosystems, and so we need to plan future growth carefully. At the same time, the high demand for housing across New Zealand has spawned a housing crisis that has resulted in politicians asking for more housing with fewer planning rules. A project with Toka Tū Ake, the Natural Hazards Commission, is developing an innovative Agent Based Model to understand why and where developers build houses and how this is influenced by hazard and zoning policies. The simulation model will be used to understand how best to design planning policies that protect future generations. This highly collaborative approach that joins together environmental planning researchers with city planners and policymakers helps to strike a balance between reducing the risk of potential hazards and future liabilities while satisfying the desire to expand land use to meet housing needs.

Adaptation research need not be limited to top-down implementation of research in vulnerable places, but may arise organically from members of the community who have inhabited our cherished spaces for a very long time. Indigenous Māori knowledge concerning natural hazards provides valuable insights for how we should embrace existing conditions and adapt to the environment that surrounds us.

Moreover, sustainable development calls for greater communication with an engaged public who may or may not support significant changes in how to navigate the world. Our researchers have identified areas where progress could occur at greater speed given public consensus, and other areas where more work will be required to convince a sceptical public of the need for radical change.

It is beyond doubt that the climate is changing, but questions linger about when, why and how quickly it will unfold. We still need to act, and better that we act now than leave it for our descendants to contend with something far worse than we have experienced recently. The University of Waikato's environmental planning researchers empower responsible and prudent choices when it comes to sustainability.

2024 HIGHLIGHTS

Our research during 2024 drew from a variety of materials including historical experiences, Indigenous knowledge, policies and the views of the public to build insights that will support society to be resilient to natural hazards and climate change into the future.

AI and public consultation

In 2024 our researchers applied cutting-edge approaches to draw deeper insights from public submissions on plans at regional and national levels.

We used natural language processing, a branch of AI, to rapidly process text-based submissions to distil insights, identify research gaps and provide new opportunities to analyse how responses differed between sectors or groups.

Climate adaptation

As the climate changes, making some natural hazards worse and creating a need for some communities to relocate, our researchers explored adaptation strategies and the insights required to manage changing risks effectively.

We investigated and confirmed that in order to be flood-resilient, New Zealand needs to reconfigure its flood governance to achieve national consistency, while maintaining some variability to be effective at local scale.

We also analysed the contentious topic of 'managed retreat', aiming to identify and understand how this policy became accepted in Aotearoa New Zealand and what other countries can learn from our experience.

Indigenous knowledge

Indigenous knowledge is critical for designing appropriate and effective climate change adaptation strategies. By highlighting histories of Māori communities relocating in response to natural hazards, we aimed to provide insights to help plan for future adaptation.

Analysis of local knowledge in Jakarta, Indonesia, showed the potential for flood adaptation to incorporate Indigenous approaches to living harmoniously with water.



Sustainable innovation for people, business and the environment

From reimagining industrial processes to revolutionising housing construction, the University of Waikato is at the forefront of creating transformation that serves people, businesses and the environment.

Researchers at the University have created projects to proactively shape a sustainable future, from tackling local priorities, including housing affordability and decarbonisation of industry to creating hybrid and electric technologies and pioneering a circular economy for New Zealand.

As New Zealand faces a housing crisis, the University's Te Kura Mata-Ao School of Engineering has developed novel solutions to address housing accessibility and affordability. In partnership with industry leaders, we are exploring cutting-edge construction methods using recyclable materials, including cold-formed steel and composites, to make construction faster and cheaper.

University researchers are leading Āmiomio Aotearoa, a project focused on the development of a circular economy for New Zealand. In this cross-disciplinary project, researchers are working alongside other academics and industry to embed sustainability across materials, people, business and policy. It includes innovations like creating design for adaptability (disassembly and versatility) and

building systems from recycled, recyclable and regenerative materials such as cellulose from plants. These are more than research initiatives; they are pathways to eliminate waste and pollution and to circulate products and materials to reduce human impact on the environment.

By enabling industries to simulate and optimise processes, we have made significant strides towards decarbonising New Zealand's industrial process heat sector. The University is home to the Ahuora Centre for Smart Energy Systems, whose mission is to help create more sustainable New Zealand industries that sit in harmony with the environment and people. The \$12.5m project funded through the Ministry of Business, Innovation and Employment will help re-engineer the way we use, convert, supply and store renewable energy for industrial process heating.

Ahuora's digital twin technology will address the urgent challenge of climate change by working with some of our most energy-intensive industries to reduce carbon emissions.

2024 HIGHLIGHTS

To create a sustainable future, we cannot just respond to societal and environmental challenges, we must work alongside industry, businesses and government to proactively engineer a more sustainable world. Our research in 2024 focused on:

Affordable housing

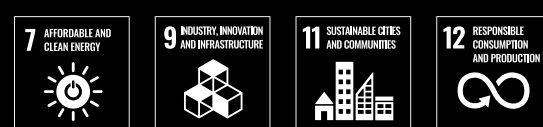
New Zealand faces a critical housing shortage with some of the most rapid house price rises in the Organisation for Economic Co-operation and Development (OECD). Our research on affordable housing in 2024 revealed how cold-formed steel may be able to be used to create cost-effective, durable and sustainable housing, and how 3D printing technology could disrupt the current housing model to provide efficient housing solutions.

Ahuora decarbonising industry

Ahuora is working to create more sustainable New Zealand industries through smart energy systems that support New Zealand's journey to net zero carbon. Our research during 2024 explored digital twin technology to decarbonise industrial processing and factory-centred energy storage solutions for solar and wind energy. Researchers have also developed an algorithm to optimise a hybrid energy system to minimise carbon output while maintaining reliable energy supply. Technologies including self-powered circuit breakers and supercapacitor-buffered appliances create more efficient and sustainable home appliances. These innovations also contribute to reducing carbon emissions, enhancing grid reliability, and creating cost-effective, resilient energy solutions.

Āmiomio Aotearoa, a circular economy for New Zealand

Āmiomio Aotearoa is helping New Zealand's transition to a circular economy, supporting sustainable product development for current and future generations. The transition to a circular economy requires a paradigm shift in society's relationship with products and the materials from which they are made. In 2024, our research aimed to create sustainable, eco-friendly materials by combining regenerative materials including natural fibres such as hemp bast, hemp hurd and harakeke (flax) with polymers for packaging and construction materials. Using natural fibres allows us to improve the strength, environmental impact and recyclability of 3D printed materials, offering an alternative to traditional plastics and building materials.



Improving outcomes by targeting healthcare access and equity

Globally, chronic health conditions have placed resourcing demands upon already strained healthcare systems, thereby further exacerbating inequities. Our ageing population and a forecasted increase in immigration mean demand on our health system is unlikely to decrease in the future.

At the University of Waikato we understand that primary care is crucial to improving health outcomes and reducing overall healthcare costs. Our academics are producing impactful research to support primary care health systems, including tackling healthcare inequities, preventing illnesses or detecting illnesses early, addressing healthcare workforce shortages and collating evidence to aid health policy.

In 2024 our researchers used national-level data on lung cancer and breast cancer to reveal disparities in wait times, access to surgery and treatment between Māori and Pākehā patients. Our research highlights that inequities persist and gives greater visibility to the need for timely and equitable treatment.

Our researchers uncovered that patients diagnosed with lung cancer through emergency departments in the Waikato had more advanced-stage disease and lower survival rates than those diagnosed by their general practitioner. This further validates our aim to strengthen primary healthcare.

Our team of diabetes researchers is working alongside primary health organisations (PHOs) to forge new pathways for diabetes patients, particularly Māori who are disproportionately impacted. We showed that technology-enhanced, culturally informed primary care results in sustained improvements for Indigenous patients with type 2 diabetes.

Also, our research identified high rates of psychological distress in people with type 1 diabetes, particularly females and Māori, providing an objective rationale for routine screening of psychological distress in diabetes care.

As a university in heartland Waikato, we are committed to improving healthcare access for those in traditionally underserved regional and rural areas. In 2024 our researchers collaborated with academics across the country to address the challenge of geographic equity in health service design because, as we discovered, New Zealand's most remote communities use health services the least, even though they have the highest rates of preventable deaths. This work is vital evidence to aid in making better policy decisions.

The University listened to our Primary Health Organisation (PHO) collaborators and other healthcare providers to address primary care workforce shortages. To this end, the University signed a Memorandum of Understanding with three PHOs to create a regional network of training facilities to support interprofessional clinical placements across a range of primary care health professions.

Moreover, we are building new pathways to train and fast track graduate health workers.

In 2024 we continued to be the leading provider for postgraduate nursing students and laid the groundwork for our Masters of Clinical Practice Midwifery and our Master of Pharmacy Practice, which welcome their first cohorts in 2025.



2024 HIGHLIGHTS

We recognise the power of local and global partnerships between researchers, practitioners and patients to address shared healthcare challenges. Addressing the combined challenges of climate change, natural disasters, population ageing, and chronic disease requires moving beyond 'business as usual' and working in partnership to identify and implement societal improvements.

In 2024 we forged new relationships and built on current collaborations to improve the health and wellbeing of people in New Zealand and across the globe.

Supporting disease prevention and early detection

Early detection and prevention reduces demands on over-burdened secondary and tertiary healthcare services and has significant impacts on our quality of life. Primary healthcare providers are vital for early diagnosis and preventative education.

In 2024 our researchers interrogated data and synthesised evidence on major health issues that matter to New Zealanders – diabetes, cancer, and rural health.

Our researchers are pinpointing the numbers and identifying treatment patterns and outcomes to better understand the barriers and facilitators for structuring primary healthcare that works optimally for all New Zealanders, at all stages of life, wherever they live.

Global partnerships to inform policy for equitable and resilient health systems

The University of Waikato and Hiroshima University are leading a multi-organisational research collaboration to establish resilient health systems that support healthy and equitable communities through a constantly changing future.

With support from Royal Society of New Zealand Te Apārangi and the Japan Society for the Promotion of Science, the initiative is focused on learning from healthcare responses to natural and climate-related emergencies in New Zealand and Japan and exploring the impact of different healthcare systems on rural communities, with a strong focus on Indigenous innovation.

In 2024 our research team visited Japan to share critical insights into rural healthcare delivery, chronic disease management, and emergency response through site visits.

Our researchers are creating new knowledge to identify the strengths and areas for improvement of two different healthcare systems that must respond to the multifaceted challenges of surging healthcare demands, climate change and demographic change.

This unique international collaboration is identifying opportunities for system-level improvement that will be able to inform policy development in both countries.



Protecting and restoring our oceans and waterways

The University of Waikato is a leader in marine conservation research, committed to protecting and restoring the health of our oceans and coastlines. With campuses in Hamilton and Tauranga, our Tauranga location places us at the heart of a diverse marine environment, surrounded by coastal catchments, estuaries, lakes, Whakaari/White Island and New Zealand's largest working harbour.

Our approach to research integrates mātauranga Māori with Western science. We have formed strong partnerships with iwi to deepen our understanding of the intricate world of marine ecosystems. This intergenerational knowledge provides critical insights into real-world issues such as climate change, globalisation and an increasing pressure on marine resources. As the climate crisis intensifies, we are at the forefront of developing innovative solutions to protect ocean ecosystems for future generations.

For more than 50 years, our researchers have been studying the Bay of Plenty's coastal and marine environments. The Coastal Marine Field Station was established in 2011, following the MV Rena grounding and oil spill, New Zealand's worst marine ecological disaster. Our scientists played a pivotal role in the response and recovery efforts, using their expertise to assess environmental damage and drive long-term restoration. Today, our support in opening the Raukōkore Marine Research Centre in the Eastern Bay of Plenty continues this mission, supporting sustainable aquaculture and marine health.

Our marine science team brings together internationally recognised expertise across marine ecology, geosciences, marine bioactive compounds and ocean sustainability. We work closely with regional and local councils to ensure our research supports practical outcomes, from coastal resilience and urbanisation impacts to climate-driven

changes in marine and freshwater ecosystems. Our integrated, mountain-to-sea approach recognises the vital connection between land, freshwater and ocean environments, helping to inform better policy and conservation practices.

Our global partnerships allow us to collaborate with leading research institutions, including Scripps Research (USA), the Australian Institute of Marine Science (AIMS), and the United States National Cancer Institute, where we are developing anti-cancer leads from marine organisms. We are also working with European Union countries to explore blue carbon (carbon dioxide stored in ocean ecosystems) as a tool to mitigate climate change.

Nationally, we provide expert advice on marine conservation, including sustainable port and harbour management, biosecurity threats, and the environmental effects of climate-driven events such as marine heatwaves, sedimentation, and cyclonic events. Our research on marine protection spans more than 40 years across New Zealand (including the Antarctic), making the University of Waikato Tauranga campus home to the longest consistent records for assessing the effects of marine protection nationally and some of the longest running programmes internationally.

The positive impact of our work is felt across the globe and our team is passionate about the importance of protecting our marine environment for generations to come.



2

ZERO
HUNGER



6

CLEAN WATER
AND SANITATION



14

LIFE
BELOW WATER



17

PARTNERSHIPS
FOR THE GOALS

2024 HIGHLIGHTS

Protecting our marine life has wide-reaching implications for the health and wealth of our nation and the world. In 2024 our researchers focused on managing external pressures on marine ecosystems, restoring aquatic habitats using Indigenous knowledge, and developing new ways to measure and improve ocean health.

Advancing aquaculture and restoring kaimoana

Shellfish restoration and sustainable aquaculture are essential for New Zealand's food security and marine health. In 2024 our researchers worked with iwi to reverse declines in mussel populations in Ōhiwa Harbour, combining Indigenous and Western knowledge to develop new ecological restoration methods. We also studied how the nutritional condition of wild mussel spat (juvenile mussels) influences growth and harvest outcomes, highlighting the need for interventions to improve spat quality and supply for the aquaculture industry. These findings will help create more resilient, high-yield mussel farms that support both economic and ecological sustainability.

Protecting our environment with seaweed

Seaweed is emerging as a powerful natural solution for environmental restoration. In 2024 we explored how seaweed can clean waterways, improve biosecurity and support sustainable agriculture. With an \$11.4m grant from the Ministry of Business, Innovation and Employment's Endeavour Fund, our research focused on how seaweed-derived sugars can protect crops from biosecurity threats like the Psa bacterium while reducing agricultural runoff into waterways. We also trialled new methods for cultivating seaweed spores, making production more efficient and cost-effective and identifying which seaweed cultivars are most effective at treating wastewater. Together, these projects are expanding our knowledge of how seaweed can be used for marine conservation and commercial applications.

Understanding human impact on the underwater world

Human activity is significantly impacting marine and freshwater ecosystems. In 2024 our researchers studied the effects of rising water temperatures on fish and found that higher temperatures reduce fish swimming speeds. The results highlight the need to incorporate temperature shifts in conservation strategies.

We also examined how intensified land use affects the health of mangrove forests, uncovering essential data for regional ecosystem models, coastal management, and restoration planning. These findings will help guide sustainable land use practices that protect coastal environments. With funding from the Marsden Fund, we launched a global study on marine inequality, comparing ocean resource governance in Hawaii's aquarium fishery, salmon farming in Iceland and Ireland, and Māori claims for customary tenure alongside the development of iwi aquaculture assets. This research is building knowledge of alternative ways to govern marine systems and tackle the multiple and overlapping challenges our marine environments face.



Building evidence to support sustainable trade

Our world is facing a range of deeply interconnected challenges that pit profit against our planet. But could business be good for the environment, helping us to thrive in a changing world?

At the University of Waikato we're championing sustainability and providing the evidence to support businesses' transitioning to a low-carbon economy, sharing knowledge and insights on issues impacting New Zealand and global business.

We are home to the New Zealand Economics Forum, launched in 2021, bringing together leading economists, business leaders and public sector officials to discuss the most pressing economic issues facing the country, and we are the base for the New Zealand Institute of Business Research.

Collaborative projects such as Āmiomio Aotearoa bring together mātauranga Māori and science to develop a circular economy for the wellbeing of New Zealand. We are also working to understand how Māori and Indigenous entrepreneurs balance cultural and commercial imperatives in business, unlocking new ways of operating more sustainably where business achievement and financial success are judged by the level of contributions to the wellbeing of people and the environment, rather than by individual gain.

Using experimental economics, and blending psychology and economics, we are decoding decision-making to help us understand where business and sustainability intersect and how we can make meaningful change towards a low-carbon future.

We are also looking at the dependency of green growth on our natural resources and the prospects for early-stage green investment opportunities in Australia and New Zealand to drive a green economy that delivers the innovations we need for sustainable success.

Our global finance researchers are also involved in pioneering research on financial markets and investment analysis, including the growth of digital and crypto currencies, the emergence of retail share trading platforms and mechanisms to mitigate new and long-standing risks to trade and global economic stability.

We're committed to empowering businesses to respond effectively and thrive sustainably in our changing world.

2024 HIGHLIGHTS

We know that better outcomes for business and our economy can also equal better outcomes for people and our environment. Our research during 2024 focused on our developing carbon economy and building new options for trade where business is good for the environment, demonstrating that sustainable practices aren't just an ethical choice but also a driver of profitability, efficiency, and broader benefits for our people and the planet.

Our research in 2024 focused on:

Our carbon economy

We interrogated questions at the intersection of corporate social responsibility (CSR), carbon emissions, and financial performance, focusing on how environmental factors influence firm valuations, financial decision-making, regulatory compliance and corporate transparency and accountability. Firms that adopt effective carbon management practices may gain a competitive advantage by reducing borrowing costs and improving investor confidence, while better designed regulations can drive environmental accountability without stifling economic growth.

Green innovation

Our researchers determined the financial mechanisms and investment dynamics that support green innovation, sustainable investments, and the green transition, particularly in the face of economic and energy-related volatility. We looked at the barriers green start-ups face, investment behaviour (including how green bonds and green and sustainable Exchange-Traded Funds are influenced by market activity), energy price volatility, and the impact of this for regulatory development.

Sustainable action

Meaningful climate action must balance environmental progress with economic outcomes. Our research addressed the interconnected challenges of effectively communicating climate change, implementing policy reforms and promoting business transparency to advance sustainability, and how businesses, governments and individuals engage with these issues.



8 DECENT WORK AND ECONOMIC GROWTH



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



13 CLIMATE ACTION

Index

UNVEILING THE INFLUENCE OF ANTARCTICA

- Kim, D., Lee, H., Kim, K., Kim, S., Kim, J. H., Ko, Y. W., Hawes, I., Oh, J., & Kim, J. (2024). Persistent organic pollutants in the Antarctic marine environment: The influence impacts of human activity, regulations, and climate change. *Environmental Pollution*, 363, 125100. <https://doi.org/10.1016/j.envpol.2024.125100>
- Lumian, J., Grettenberger, C., Jungblut, A. D., Mackey, T. J., Hawes, I., Alatorre-Acevedo, E., & Sumner, D. Y. (2024b). Genomic profiles of four novel cyanobacteria MAGs from Lake Vanda, Antarctica: insights into photosynthesis, cold tolerance, and the circadian clock. *Frontiers in Microbiology*, 14. <https://doi.org/10.3389/fmicb.2023.1330602>
- Powell, T., Sumner, D. Y., Jungblut, A. D., Hawes, I., Mackey, T., & Grettenberger, C. (2024). Metagenome-assembled bacterial genomes from benthic microbial mats in ice-covered Lake Vanda, Antarctica. *Microbiology Resource Announcements*, 13(5). <https://doi.org/10.1128/mra.01250-23>
- Rasmussen, T. B., Noell, S. E., Herbold, C. W., Dickie, I. A., Richards-Babbage, R., Stott, M. B., Cary, S. C., & McDonald, I. R. (2024). Geothermal ecosystems on Mt. Erebus, Antarctica, support diverse and taxonomically novel biota. *FEMS Microbiology Ecology*, 100(11). <https://doi.org/10.1093/femsec/fiae128>
- Romano, V., Fischanger, F., Wilson, G., Sciarra, A., Mazzini, A., Mazzoli, C., Florindo, F., Tartarello, M. C., Ascani, M., Anderson, J., Worthington, R., Hardie, R., Dagg, B., & Ruggiero, L. (2024). Permafrost Hydrogeology of Taylor Valley, Antarctica: Insights from deep Electrical Resistivity Tomography. *Geophysical Research Letters*, 51(18). <https://doi.org/10.1029/2023gl106912>
- Stone, M. S., Devlin, S. P., Hawes, I., Welch, K. A., Gooseff, M. N., Takacs-Vesbach, C., Morgan-Kiss, R., Adams, B. J., Barrett, J., Priscu, J. C., & Doran, P. T. (2024). McMurdo Dry Valley lake edge 'moats': the ecological intersection between terrestrial and aquatic polar desert habitats. *Antarctic Science*, 36(4), 189–205. <https://doi.org/10.1017/s0954102024000087>

SUPPORTING SOCIETY TO BE RESILIENT TO NATURAL HAZARDS AND CLIMATE CHANGE

- Bailey-Winiata, A. P., Gallop, S. L., White, I., Wotherspoon, L., Fa'au, T., Dickson, M., & Ellis, J. (2024). Looking backwards to move forwards: insights for climate change adaptation from historical Māori relocation due to natural hazards in Aotearoa New Zealand. *Regional Environmental Change*, 24(2). <https://doi.org/10.1007/s10113-024-02240-5>
- Fu, X. (2024). Natural Language Processing in Urban Planning: A Research Agenda. *Journal of Planning Literature*, 39(3), 395–407. <https://doi.org/10.1177/08854122241229571>
- Fu, X., Brinkley, C., Sanchez, T. W., & Li, C. (2024). Text mining public feedback on urban densification plan change in Hamilton, New Zealand. *Environment and Planning B: Urban Analytics and City Science*, 52(3). <https://doi.org/10.1177/23998083241272097>
- Hanna, C., Cretney, R., & White, I. (2022). Re-Imagining Relationships with Space, Place, and Property: The Story of Mainstreaming Managed Retreats in Aotearoa-New Zealand. *Planning Theory & Practice*, 23(5), 681–702. <https://doi.org/10.1080/14649357.2022.2141845>
- Prana, A. M., Dionisio, R., Curl, A., Hart, D., Gomez, C., Apriyanto, H., & Prasetya, H. (2024). Informal adaptation to flooding in North Jakarta, Indonesia. *Progress in Planning*, 186, 100851. <https://doi.org/10.1016/j.progress.2024.100851>
- Serrao-Neumann, S., White, I., Dean, S. M., Paulik, R., Sleight, B., Stori, F. T., Wilson, M. D., & Lane, E. M. (2023). The need to reconfigure consistency and variability to best manage changing flood risks in Aotearoa-New Zealand. *Journal of the Royal Society of New Zealand*, 54(4), 473–490. <https://doi.org/10.1080/03036758.2023.2211777>

SUSTAINABLE INNOVATION FOR PEOPLE, BUSINESS AND THE ENVIRONMENT

- Akindoyo, J. O., Pickering, K., Mucalo, M., Beg, M. D., & Hicks, J. (2024). Mechanenzymatic production of natural fibre from harakeke (New Zealand flax) and its characterization for potential use in composites for building and construction applications. *Industrial Crops and Products*, 214, 118507. <https://doi.org/10.1016/j.indcrop.2024.118507>
- Alshammari, Y., Yang, F., & Bolzoni, L. (2024). Quantification of the physical, microstructural, thermal, and mechanical properties of PZT-reinforced Ti-based composites. *Journal of Alloys and Compounds*, 1000, 175044. <https://doi.org/10.1016/j.jallcom.2024.175044>
- Busch, A. V., Kluger, M. O., & Mörz, T. (2024). Corrosion effects on axial pile capacity. *Geomechanics for Energy and the Environment*, 38, 100559. <https://doi.org/10.1016/j.gete.2024.100559>
- Chandramohan, D. L., Roy, K., Ananthi, G. B. G., Fang, Z., & Lim, J. B. (2024). Structural behaviour and capacity of cold-formed steel channel sections with elongated edge-stiffened and unstiffened web holes under compression. *Journal of Constructional Steel Research*, 218, 108681. <https://doi.org/10.1016/j.jcsr.2024.108681>
- Dar, M. A., Yadav, D., Sahoo, D. R., & Lim, J. B. P. (2024). Tests on Cold-Formed Steel Laced Stub Columns: Axial Strength and Stability Characteristics. *Journal of Structural Engineering*, 150(10). <https://doi.org/10.1061/jsemdh.steng-13240>
- Dassanayake, C., Kularatna, N., Steyn-Ross, A. and Gurusinghe, N. (2024). Self-Powered and Self-Controlled Hybrid DC Circuit Breaker for Low Voltage Applications. *2024 IEEE Sixth International Conference on DC Microgrids (ICDCM)*, Columbia, SC, USA, 2024, pp. 1-4, doi: 10.1109/ICDCM60322.2024.10665083

Gallage, N. P., Sirimanne, D. C. T., Kularatna, N., Steyn-Ross, A., & Kularatna-Abeywardana, D. (2024). Supercapacitor-Buffered DC-Operable Refrigerators for DC Homes. *2022 IEEE Applied Power Electronics Conference and Exposition (APEC)*, 2965–2971.

<https://doi.org/10.1109/apec48139.2024.10509352>

Hill, D., Tito, S. R., Walmsley, M., & Hedengren, J. (2024). Techno-economic optimization of a hybrid energy system with limited grid connection in pursuit of net zero carbon emissions for New Zealand. *e-Prime - Advances in Electrical Engineering Electronics and Energy*, 8, 100564. <https://doi.org/10.1016/j.prime.2024.100564>

Khan, M., Dani, A. A., Lim, J. B. P., & Roy, K. (2024). Appraising the Feasibility of 3D Printing Construction in New Zealand Housing. *Buildings*, 14(4), 1084. <https://doi.org/10.3390/buildings14041084>

Lang, C., Hu, Y., Goodell, J. W., & Hou, Y. (2024). Connectedness and co-movement between dirty energy, clean energy and global COVOL. *Finance Research Letters*, 63, 105304. <https://doi.org/10.1016/j.frl.2024.105304>

Wang, W., Rezaeian, H., Roy, K., Fang, Z., & Lim, J. B. (2024). Axial capacity of a novel cold-formed steel swaged section: Experimental tests and design. *Journal of Building Engineering*, 90, 109494. <https://doi.org/10.1016/j.jobbe.2024.109494>

Sam, V. S., Nammalvar, A., Andrushia, D., Gurupatham, B. G. A., & Roy, K. (2024). Flexural Behavior of Galvanized Iron Based Cold-Formed Steel Back-to-Back Built-Up Beams at Elevated Temperatures. *Buildings*, 14(8), 2456. <https://doi.org/10.3390/buildings14082456>

IMPROVING OUTCOMES BY TARGETING HEALTHCARE ACCESS AND EQUITY

Boyle, L., Lawrenson, R., Nosa, V., Campbell, I., & Tin, S. T. (2024). Ethnic inequities in use of breast conserving surgery and radiation therapy in Aotearoa/New Zealand: which factors contribute? *Breast Cancer Research and Treatment*, 205(3), 641–653.

<https://doi.org/10.1007/s10549-024-07289-8>

Boyle, L., Lawrenson, R., Ronald, M., Campbell, I., Nosa, V., & Tin, S. T. (2024). Ethnic differences in time to surgery for women with early stage breast cancer in Aotearoa/New Zealand: a population-based study. *The Lancet Regional Health - Western Pacific*, 47, 101091.

<https://doi.org/10.1016/j.lanwpc.2024.101091>

Chepulis, L. M., Crosswell, R., Moorhouse, S., Morton, H., Oehley, M., Paul, R., & Crockett, H. (2024). Technology-enhanced, culturally-informed primary care results in sustained improvements in biomarkers for Indigenous patients with type 2 diabetes – a pilot study. *Journal of Primary Health Care*, 17(1), 83–87. <https://doi.org/10.1071/hc24056>

Gurney, J., Davies, A., Stanley, J., Whitehead, J., Costello, S., Dawkins, P., Henare, K., Jackson, C. G. C. A., Lawrenson, R., Scott, N., & Koea, J. (2024). Equity of travel to access surgery and radiation therapy for lung cancer in New Zealand. *Supportive Care in Cancer*, 32(3).

<https://doi.org/10.1007/s00520-024-08375-9>

Lao, C., Van Dantzig, P., Rabindranath, K., White, D., & Lawrenson, R. (2024). Treatment Patterns for End-Stage Kidney Failure in Patients With Systemic Lupus Erythematosus. *JCR Journal of Clinical Rheumatology*, 30(5), 183–187. <https://doi.org/10.1097/rhu.0000000000002088>

Lao, C., Van Dantzig, P., Tugnet, N., Lawrenson, R., & White, D. (2024). Treatment patterns in patients with systemic lupus erythematosus in New Zealand. *Lupus*, 33(11), 1260–1273. <https://doi.org/10.1177/09612033241274911>

Lawrenson, R., Lao, C., Stanley, J., Teng, A., Kuper-Hommel, M., Campbell, I., Krebs, J., Sika-Paotonu, D., Koea, J., Meredith, I., & Gurney, J. (2024). Does diabetes affect breast cancer survival? *Cancer Reports*, 7(3). <https://doi.org/10.1002/cnr2.2040>

McClintock, J. M., Chepulis, L., Blackmore, T., Fraser, S., & Paul, R. G. (2024). Psychological distress in Aotearoa New Zealand adults with type 1 diabetes. *Journal of Health Psychology*. <https://doi.org/10.1177/13591053241289189>

Nixon, G., Davie, G., Whitehead, J., Miller, R., De Graaf, B., Liepins, T., Lawrenson, R., & Crengle, S. (2024). Rural–urban variation in the utilisation of publicly funded healthcare services: an age-stratified population-level observational study. *New Zealand Medical Journal*, 137(1590), 33–47. <https://doi.org/10.26635/6965.6274>

Oetzel, J., Ngawati, R., Penetito-Hemara, D., Puke, T. T., Henry, A., Povaru-Bourne, S., & Sika-Paotonu, D. (2024). Facilitators and barriers for implementation of health programmes with Māori communities. *Implementation Science Communications*, 5(1). <https://doi.org/10.1186/s43058-024-00567-y>

PROTECTING AND RESTORING OUR OCEANS AND WATERWAYS

Bulmer, R., Paul-Burke, K., Ranapia, M., Ellis, J., Bluett, C., O'Brien, T., Burke, J., Petersen, G., & Stephenson, F. (2024). Weaving indigenous and western ecological knowledge to enhance environmental sustainability. *Ocean & Coastal Management*, 258, 107402.

<https://doi.org/10.1016/j.ocecoaman.2024.107402>

Crawford, R. M. B., Gee, E. M., Dupont, D. W. E., Hicks, B. J., & Franklin, P. A. (2024). High water temperature significantly influences swimming performance of New Zealand migratory species. *Conservation Physiology*, 12(1). <https://doi.org/10.1093/conphys/coae047>

Lawton, R. J., & Magnusson, M. (2024). Effects of seeding twine type and seeding density on hatchery performance and initial at-sea cultivation performance of the kelp *Ecklonia radiata*. *Algal Research*, 84, 103777. <https://doi.org/10.1016/j.algal.2024.103777>

McCormack, F. (2023) Marine inequality and environmental demise: Identifying imperial borders in ocean governance (Project #23-UOW-057). Royal Society of New Zealand Marsden Fund.

Lam-Gordillo, O., Hailes, S., Carter, K., Petersen, G. L., Ferries, M., Salmond, N., Douglas, E. J., **Paul-Burke, K.**, & Lohrer, A. M. (2024). Integrating rapid habitat mapping with community metrics and functional traits to assess estuarine ecological conditions: A New Zealand case study. *Marine Pollution Bulletin*, 206, 116717. <https://doi.org/10.1016/j.marpolbul.2024.116717>

Novak, I., Magnusson, M., Craggs, R. J., & Lawton, R. J. (2024). Productivity and competitive dominance of freshwater filamentous macroalgal cultivars for nutrient bioremediation of primary municipal wastewater. *Water Science & Technology*, 90(7) <https://doi.org/10.2166/wst.2024.313>

Skelton, B. M., Múgica, M., Zamora, L. N., Delorme, N. J., **Stanley, J. A.**, & Jeffs, A. G. (2023). Nutritional condition of wild and hatchery-reared, green-lipped mussel (*Perna canaliculus*) spat used for aquaculture. *Aquaculture, Fish and Fisheries*, 4(1). <https://doi.org/10.1002/aff2.145>

Thomson, T., Ellis, J. I., Fusi, M., Prinz, N., Lundquist, C. J., Bury, S. J., Shankar, U., Cary, S. C., & Pilditch, C. A. (2024). Effects of catchment land use on temperate mangrove forests. *Science of The Total Environment*, 940, 173579. <https://doi.org/10.1016/j.scitotenv.2024.173579>

BUILDING EVIDENCE TO SUPPORT SUSTAINABLE TRADE

Benkraiem, R., Qureshi, M., **Saeed, A.**, & Zopounidis, C. (2024). Corporate social responsibility, carbon footprints and stock market valuation. *Financial Markets, Institutions & Instruments*, 33(3), 213–237. <https://doi.org/10.1111/fmii.12193>

Burns, E. (2024). Culture, Denial, Recycling, Tree-Hugging: Many registers learning the seriousness of climate change. In T. Bowell, N. Pepperell, A. Richardson, & M.-T. Corino (Eds.), *Revitalising Higher Education: Insights from Te Puna Aurei LearnFest 2022*. Cardiff: Cardiff University Press. <https://doi.org/10.18573/conf2.1>

Cai, W., **Bai, M.**, & **Davey, H.** (2024). Mandatory environmental disclosure policy in the largest carbon emission country. *Pacific Accounting Review*, 36(5), 527–560. <https://doi.org/10.1108/par-04-2023-0055>

Conlon, T., **Corbet, S.**, & **Hou, Y.** (2024). Navigating the green transition: the influence of energy volatility on green and sustainable ETFs. *Applied Economics Letters*, 1–7. <https://doi.org/10.1080/13504851.2024.2337323>

Mann, E. C., Safari, N., Oetzel, J., Dillon, S., & Williamson, A. J. (2024). Less is more? Communicating SDG orientation and enterprises' economic performance. *Journal of Business Venturing Insights*, 22, e00470. <https://doi.org/10.1016/j.jbvi.2024.e00470>

Mukherjee, A., Owen, R., Scott, J. M., & Lyon, F. (2024). Financing green innovation startups: a systematic literature review on early-stage SME funding. *Venture Capital*, 1–27. <https://doi.org/10.1080/13691066.2024.2410730>

Okorie, D. I., & Wesseh, P. K., Jr. (2024). Fossil fuel subsidy removal, economic welfare, and environmental quality under alternative policy schemes. *Journal of Cleaner Production*, 450, 141991. <https://doi.org/10.1016/j.jclepro.2024.141991>

Sun, Y., Su, K., Cai, W., & **Bai, M.** (2024). Is transparency in sustainability the fruit of business trust: Evidence from sustainability disclosure? *International Journal of Finance & Economics*. <https://doi.org/10.1002/ijfe.3022>

Xu, D., Hu, Y., Corbet, S., Hou, Y., & Oxley, L. (2024). Green bonds and traditional and emerging investments: Understanding connectedness during crises. *The North American Journal of Economics and Finance*, 72, 102142. <https://doi.org/10.1016/j.najef.2024.102142>

Xu, D., Hu, Y., Corbet, S., & Lang, C. (2024). Return connectedness of green bonds and financial investment channels in China: Implications for hedging and regulation. *Research in International Business and Finance*, 70, 102329. <https://doi.org/10.1016/j.ribaf.2024.102329>





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