

New Zealand Members Group Climate Change Action Plan

<p>Introduction Overall problem statement</p>	<p>The New Zealand (NZ) Members Group notes IChemE's position on climate change.</p> <p><i>(For all chemical, process, bioprocess engineers in New Zealand, and complementing the action plans developed by individual special interest groups (SIG) eg Water SIG, Food & Drink SIG)</i></p> <p>Our NZ action plan presented here builds on this statement and forms part of IChemE's NZ Members Group delivery against the primary commitment to:</p> <ul style="list-style-type: none"> ■ develop detailed positions and action plans for economically sustainable and secure transitions to net zero carbon emissions in all areas of chemical engineering practice. <p>Our action plan will also help underpin work on several other commitments included in the IChemE position on climate change, including:</p> <ul style="list-style-type: none"> ■ provide policy advice to governments based on chemical engineering experience and expertise; ■ engage in public outreach activities with businesses and communities, to understand their concerns about the threats and uncertainties posed by climate change; ■ develop training courses and mandate continuing professional development (CPD) to provide the knowledge and skills to support members in the transition to a net zero carbon economy and in climate change adaptation; ■ encourage all regional members groups and special interest groups to hold webinars and seminars as part of the CPD programme, enhance skills and knowledge in pursuit of zero carbon futures and understanding of climate risks, and to engage with the wider engineering membership.
<p>Specific problem statement</p>	<p>New Zealand is a small economy that relies on primary industries for exports (eg dairy, meat, wood and foods) as well as small scale oil and gas and other infrastructure to support its population of 5 million. It is more than 80% percent renewable in electricity; with hydro, geothermal and wind being the major contributors to supply.</p> <p>It is essential to take a fair, holistic and systems thinking approach to plan for and decarbonise New Zealand's industries and infrastructure, not simply reducing fossil fuel consumption, but also proactively identifying and developing renewable alternatives for these fuels (eg biomass, electricity, direct geothermal, hydrogen, and other alternatives) and advocating support for transitioning to cleaner fuels.</p>

	<p>Without NZ adopting a proactive stance on a holistic, fair transition and adaption of renewable fuel alternatives:</p> <ul style="list-style-type: none"> ■ obvious energy reductions and optimisation of processes may not be considered by retrenching sectors; ■ engineering development and investment in new technologies will not occur at the rate we need to meet carbon-zero commitments, and ultimately; ■ NZ members will move away from the chemical engineering profession, eroding the experience and expertise required to advance and develop NZ in a low carbon world. <p>The New Zealand Climate Change Commission has proposed some ambitious targets for fossil fuel removal, but not an obvious carbon zero transition plan. Chemical, bioprocess and process engineers in New Zealand are uniquely placed, due to this country's small population, to collaborate and take action across multiple sectors. We also have members who already operate at very senior levels; thereby being instrumental in leading the development of any transition plan, and its uptake.</p> <p>We can offer solutions that will improve:</p> <ul style="list-style-type: none"> ■ deployment of new technologies or adaptation of old; ■ carbon and energy cost effectiveness of existing operations; ■ application of broader thinking to carbon neutral (net) challenges and mitigations and; ■ ensure holistic outcomes for New Zealand eg circular bioeconomy solutions across sectors.
<p>What actions need to be taken to address the issue?</p>	<p>Our members want a strategy that aligns with the Climate Change Commission, to drive an equitable, inclusive and just transition process.</p> <p>Specifically, we will:</p> <ul style="list-style-type: none"> ■ promote what New Zealand chemical engineers are already doing nationally and internationally about the climate change; ■ support transition and sustainable technology developments; ■ collaborate with the IChemE SIGs (eg Water SIG, Food & Drink SIG, Sustainability SIG) and others in New Zealand (eg oil & gas sector) who are active already in this area; ■ collaborate and corroborate with the Climate Change Commission, government, and other industry bodies on climate change initiatives (where relevant to chemical engineering), and; ■ publicise and share our work through public access webinars, open access articles on our web pages, submissions to other publications, via social media and through IChemE's media centre. <p>Zero carbon plan</p> <p>As IChemE's New Zealand members group we are driven to play an active role in developing a country-relevant carbon neutral (net) action plan and encourage our members to do the same. Our willing input should include consideration of:</p> <ul style="list-style-type: none"> ■ actions involving the NZ government; ■ chemical engineers will use their knowledge of industry and infrastructure to encourage the NZ government to provide strong financial incentives to assist support of the mitigations and adaptation required eg increases in carbon taxes, tariffs on imported emissions, and/or the imposition of carbon tax on international flights and shipping.

	<p>Actions for New Zealand industries:</p> <ul style="list-style-type: none"> ■ prioritize support for transition (from coal and other fossil fuels) where alternative energy technology or cleaner low carbon infrastructure already exists locally eg zero-emission electricity or renewable gases; ■ consult with and support of existing industries reliant on fossil fuels (eg process heating or electricity generation) to keep operating safely and reliably; so these industries are also included to mitigate and adapt, moving to a low-carbon future e.g. through decarbonizing or carbon capture, carbon as a feedstock, carbon sequestration; ■ plan for the timeframes for emerging technologies and infrastructure to become economical ie developing and commercializing hydrogen and biofuels technologies; ■ engage and collaborate with all stakeholders in our professional capacity for inclusive approaches supporting decarbonization; ■ ensure carbon emissions are not inadvertently transferred overseas; either geographically, socially, economically, or environmentally, by understanding the carbon lifecycle and international impacts of proposed changes; ■ assist in the development of a road map to support New Zealand's industrial transition to carbon neutral (net); ■ leverage all government funding avenues to fund technology innovation at the demonstration or pre-commercialisation stages for new low carbon technologies (eg through MBIE, EECA, Callaghan Innovation). <p>Action on process & plant efficiencies:</p> <ul style="list-style-type: none"> ■ prioritize and focus on reducing energy consumption through process optimization, process control and other process engineering improvements; ■ develop and share tools to assist quantifying and mitigating carbon emissions, adoption of lower carbon approaches to existing operations and energy sustainable processes; ■ complete full and robust assessments of carbon lifecycles, emissions, and their impacts with regards to driving a circular bioeconomy; and not shift adverse impacts elsewhere. <p>Action on decarbonising energy:</p> <ul style="list-style-type: none"> ■ promote to ensure 'cleaner burning' transition energy sources are available for the short to medium term energy transition eg methanol, natural gas, LPGs (liquified petroleum gases), biogas; ■ collaborate on renewable energy sources including; wind, wave, hydro-electric, and solar power options for increased electrification of New Zealand; ■ work with the transmission and distribution sides of the electricity sector to ensure that demand flexibility options are built to help reach a 100% renewable grid; ■ support moves to modify the electricity market so that it will function with 100% renewable generation; ■ support all developments of green fuels technologies, such as fuels from hydrogen, biomass, waste, and other feedstocks; ■ support IChemE special interest groups actions (relevant to New Zealand) eg Water, Food & Drink, Sustainability, and Clean Energy.
<p>What skills, training gap or facilitation requirements need to be addressed?</p>	<p>Support of members whose industries are affected to redirect current workforces and facilitate the transfer of the highly skilled people from fossil-fuelled industries to NZ's emerging industries:</p> <ul style="list-style-type: none"> ■ support the education, training, and application of skills of future workforces, with particular focus to New Zealand's challenges; ■ ensure the university and professional training curriculums cover fundamental engineering applications, unit operations, and environmentally sustainable design to support future energy sources and fuels eg energy systems

	<p>engineering, scale up from pilot to full scale to expand the critical technologies adapting to a low carbon future;</p> <ul style="list-style-type: none"> ■ advocate and promote chemical, process and biochemical engineering in schools to increase university and ultimately graduate numbers; ■ ensure chemical engineering students and professionals understand their responsibilities for developing a sustainable future, and promotion away from conventional technologies, moving to lower carbon processes and solutions eg avoiding use of high GWP HFCs.
<p>What actions should the MG, its members, and others take to support delivery of the above actions?</p>	<ul style="list-style-type: none"> ■ collaborate and support of New Zealand chemical, biochemical and process engineers to take action across multiple sectors; ■ seek clarity on priorities for our mitigations and transition plan to carbon neutral (net) and how these integrate with other government initiatives eg water reform; ■ include a global “System Thinking” approach for all emission reducing solutions; full and robust assessment of lifecycles, their emissions, and any potential adverse impacts, together with the drive to a circular bioeconomy is essential in decision making; ■ apply a circular bioeconomy approach consistently throughout all the project stages: planning, design, construction, operation, and decommissioning; ■ engage through our professional networks to understand the investments and options available for carbon neutral (net) and/or innovations; ■ prevent one sector being disadvantaged by decisions in another through good understanding of all NZ's sectors, the inter-relationships and impacts on other sectors / markets; and working with stakeholders including Iwi Māori; ■ support the key industries like natural gas and the electricity generators to keep operating safely and reliably, during the transition to carbon neutral (net); ■ support the transmission and distribution infrastructure for our zero emissions electricity, and promote new balancing and grid inertia services eg new industrial processes and thermal batteries; ■ encourage the development of all emission reducing technologies and innovations as well as setting appropriate commercial timeframes for infrastructure to be repurposed or established eg hydrogen, future electricity generation; ■ seek to prevent the offshore/oversea transfers of New Zealand emission reductions through closure of industry; ■ plan for and hold New Zealand climate and renewable energy focused networking, technical and communications events at pre-planned intervals.
<p>Next steps</p>	<ul style="list-style-type: none"> ■ in the next 12 months, the New Zealand Members Group, led by the IChemE Board of New Zealand, will plan for and hold at least two climate change and transition focussed events to collaborate and share collective knowledge and solutions (so these become an integral part of our regular regional & national activities), connect with and maintain communication with industries that have been identified as high carbon emitters and are embarking on significant decarbonising projects; and publicize and share what they are achieving; ■ by 2024 (in line with the IChemE strategy), we will have identified the key opportunities and challenges for New Zealand; and will have continued our earlier actions; ■ beyond 2024, we will have an updated Climate Change Action Plan specifically for New Zealand based chemical, biochemical and process engineers supporting infrastructure and industries. <i>Note: this will be considered a live document.</i> <p>Note: Any opinions are those of the authors and do not necessarily represent those of IChemE.</p>