Environment Special Interest Group Climate Change Action Plan

Introduction Overall problem statement	Environment Special Interest Group (ESIG) notes IChemE's position on climate change. The action plan presented here follows on from this statement and forms part of IChemE's delivery against several of the commitments set out, namely to: develop detailed positions and action plans for economically sustainable and secure transitions to net zero carbon emissions in all areas of chemical engineering practice and regions where members are active. It will also help underpin work on several other commitments, including: ■ 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 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 to enhance skills and knowledge in pursuit of zero carbon futures and understanding of climate risks, and to engage with the wider membership.
Specific problem statement	ESIG is the main special interest group that solely focuses on environmental issues. We were established as a specialist group before climate change was considered a major global problem. However, ESIG has always offered consistent and rational professional opinion; highlighting the problems of climate change and the unique contribution chemical engineers can make. ESIG has been lobbying hard since its inception, ensuring that climate change gets proper recognition within IChemE and the wider community. The agenda for action is very immediate if we are to avoid catastrophic climatic events associated with a global rise in temperature of 2 ^{o}C. Following the 2016 Paris Agreement, many countries now have national policies in place to reach a net zero carbon target by 2050. However, the current NDCs, (Nationally Determined Contributions), by the 191 signatory countries result in 2030 greenhouse gas emissions about 16% higher than in 2010. The UN estimates that 2030 emissions need to fall by 45% on 2010 levels if we are to contain a global temperature rise to 1.5 ^{o}C, as defined in the Paris Agreement. [1]

	We anticipate that chemical engineers will have a pivotal role in meeting these objectives. Key issues in which ESIG members will continue to have a positive influence on climate change and net zero carbon targets include: ■ climate change policy development and implementation; ■ environmental regulation in support of climate change; ■ process design and development to mitigate the effects of climate change; ■ environmental impact assessment and climate change; ■ monitoring air quality, water quality and soils and the implications for climate change; ■ monitoring cross media interaction and the effects on climate change. These topics have primarily been addressed by a very active series of specialist webinars, workshops, site visits and training events and they will continue under this arrangement. [1]United Nations, Intergovernmental Panel on Climate Change.
What actions need to be taken to address the issue?	Process and chemical industries around the world need to fundamentally change if the adverse effects of climate change are to be avoided and the net zero carbon targets are to be met. By the very nature of the problem, the actions that need to be taken are a combination of global and local actions. Policies need to be co-ordinated at an international level through the UN and other global agencies. However, the solutions lie in the technical detail of individual sectors and companies that chemical engineers are only too aware. In this respect, IChemE can play an essential role linking the output from the UN agencies with the very real contribution chemical engineers can make over the next few years. In essence, chemical engineers have a key role to play in reversing the adverse effects of climate change. Key actions that need to be taken include: ■ development of carbon sequestration technology, including carbon capture and storage; ■ development of emission control technologies; ■ mass deployment of renewable energy; ■ effective waste minimisation, recycling and life cycle analysis; ■ deployment of advanced nuclear reactors including the development of fusion; ■ improvements in process technology for the water cycle; ■ enhancements in the efficiency of food production and processing.
What skills, training gap or facilitation requirements need to be addressed?	ESIG has long recognised that there are skill shortages associated with environmental best practice, amongst chemical engineers in industry and universities. Indeed, it is only comparatively recently that some of these skill shortages have been addressed. In particular, training gaps and competencies exist in: ■ environmental policy development in the process and chemical industries; ■ appropriate environmental regulation and its implementation; ■ environmental risk assessment and carbon accounting related to environmental protection and climate change actions; ■ process design and development associated with enhanced environmental performance; ■ environmental impact and audit of specific process operations.

	ESIG has the capability to address many of these training gaps and provides support in competency assessment across the IChemE. ESIG will aim to support through the continued hosting of high-quality seminars and collaboration in international conferences and training events.
What actions should the SIG and its members take to support delivery of the above actions?	ESIG will continue to commit to a radical, but carefully thought through, agenda for action. This will include: ■ sector specific support via webinars and project initiatives to drive net zero carbon commitments. (At least 4 webinars each year); ■ push for climate change policy development at IChemE; (through support for at least one policy initiative each year); ■ professional representation on working parties and government climate change initiatives (by attending at least 2 working parties); ■ educational support on climate change via the ESIG schools' bursary and support to chemical engineering students for conference attendance; ■ collaboration with other SIGs and professional engineering institutions where appropriate. In collaboration with the IChemE, ESIG commits to the development of training materials and the support of events specific to environmental performance and climate change. (At least 3 projects each year). Under IChemE initiatives, we are prepared to share information and data related to environmental performance improvement and to work with IChemE staff to develop policy positions and/or support government and regulators in this area. ESIG is prepared to lead appropriate behavioural changes in environmental performance and to set professional examples through our individual and group activities. ESIG will continue to work with other SIGs, regional groups, and other professional engineering institutions to support joint initiatives and peer to peer monitoring.
What actions will you encourage others to take?	Climate change is central to ESIG's activities and sphere of influence. In this respect there are very few climate change issues that are beyond the group's ability. However, there are areas of responsibility that do sit outside ESIG and primarily reside with the IChemE administrative structure or wider community. On this basis, ESIG will continue to influence the wider debate on climate change within the IChemE and beyond. In particular: ■ IChemE should take more ambitious actions to lead on climate change; ■ IChemE should be more influential in the international climate change debate; ■ IChemE should engage with wider society to better understand the contribution, but also the limitations of, chemical engineering to mitigate the effects of climate change; ■ IChemE should influence opinion formers and policy makers and should take the lead where climate change interfaces with the chemical and process industries.
Next steps	The following next steps have been identified by ESIG: ■ in the next 12 months, ESIG will continue to run a series of webinars, training initiatives and give policy advice on climate change; ■ beyond 2024, ESIG will aim to support the positioning of IChemE as a highly respected professional body in the understanding of the impact of the chemical and process industries on climate change. Note: Any opinions are those of the authors and do not necessarily represent those of IChemE.