IChemE Energy Centre

The IChemE Energy Centre Climate Communiqué

Solutions for climate challenge

Governments and other decision-makers are increasingly becoming aware of the risks posed by climate change. Whilst the threat is very real and should not be underestimated, what decision-makers really need is expert advice on how best to respond to that threat.

The Institution of Chemical Engineers (IChemE) Energy Centre offers a source of expert information for policy-makers and decision-takers on a range of energy related challenges. The IChemE Energy Centre harnesses the chemical engineering skills of its members (over 42,000 distributed worldwide, with major groups in Europe, SE Asia and Australasia) and methods to provide evidence-based information on low carbon solutions to energy production and consumption.

Chemical engineers are:

- **involved in all parts of the energy system**
- **major contributors to technology innovation and deployment**
- **genuine exponents of systems thinking**
- **champions of life cycle thinking to assess which products and processes are truly sustainable**
- **business leaders in key economic sectors**

The IChemE Energy Centre will be publishing recommendations for action on five priority topics:

1. **Energy efficiency** with a focus on minimising energy consumption in the chemicals sector; reuse of waste energy; integration with external energy providers; and the development of technologies.
2. **Energy storage and grid management** with a focus on storage and smart grid technologies; and the challenges in managing power supply and demand from renewable energy generation.
3. **Carbon capture, storage & utilisation (CCSU)** with a focus on the feasibility of using CCS technology on a large scale; and bringing reality to the promise utilisation strategies.
4. **Nuclear** with a focus on new build, advanced fuel cycles and reactor design; and waste management and decommissioning.
5. **Sustainable bioenergy** with a focus on the sustainable conversion of wastes, non-food crops and fast-growing plant-matter; and the water-energy-food nexus.

The technologies exist **now** to deliver massive energy savings and greenhouse gas emission reductions in all five of these priority areas. Taken together, they represent a pathway to a decarbonised energy system that can be realised **now**, as long as the agreement made at COP21 recognises that the time has come for deployment of such technologies. The Communiqué on the next page calls for the governments meeting in Paris to deliver an effective agreement. Failure to do so will have serious consequences.

Effective policy to combat climate change needs to be shaped by three guiding observations: firstly our energy, water, land, and other natural resource systems are all inter-connected and must be consider together; secondly global poverty and inequity must be addressed to ensure communities are less vulnerable to the impacts of climate change, including who should bear its cost; and finally understanding that these issues of scale, dynamics and uncertainty across the broad socio-economic-environmental-technical sphere requires comprehensive system-analytic tools to de-mystify their complexity and support decision making.

Policies to combat climate change need to be clear, long-term, coherent, and inclusive. They must be supported by regulatory regimes which are evidence-based and fit-for-purpose. The failure at previous conferences and summits to deliver anything meaningful on climate change demonstrates that the world is in desperate need of better and more effective energy policies.

Chemical engineers not only understand the problem but can also provide decision-makers with the tools for mitigating climate change.

And those tools and solutions are needed now.

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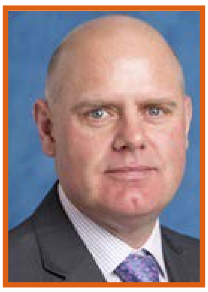

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We know that climate change is real. Chemical engineers have the tools to mitigate it and are already helping to reduce our reliance on fossil fuels.

Human activity and climate change

The scientific case around the causes of climate change is settled. John Tyndall determined that CO_2 was a greenhouse gas in 1859. Since that time, CO_2 concentrations have risen from approximately 280 parts per million (ppm) to over 400 ppm. It has been demonstrated that our climate is warming and that human activity (through emissions of CO_2 and other greenhouse gases) is the main cause. In 2014, the Intergovernmental Panel on Climate Change (IPCC) stated that the evidence of anthropogenic emissions of CO_2 and other greenhouse gases causing climate change was unequivocal.[1]

Risks of inaction

The risks posed by climate change, though complex, are sufficiently well understood to justify action. To date, however, we have not responded appropriately to the gravity of the threat. Indeed, since the IPCC's formation in 1988, numerous conferences and summits have been held on this issue but little has been achieved. In the same period, atmospheric CO_2 concentrations rose from 350 ppm to over 400 ppm.

The lack of action at previous conferences and summits means that, at the climate talks in Paris, governments need to reach an effective, global agreement. Any failure to do so could have serious adverse effects on human wellbeing and the natural world.

Responding with what we have to hand

Responding to the climate challenge is actually very simple. Globally, we derive more than 80% of our energy from fossil fuels, which currently results in vast amounts of CO_2 being emitted into the atmosphere. We need to stop doing this.

In fact, we already have the technologies needed to achieve the target of limiting atmospheric CO_2 concentrations to 450 ppm. Referring to Pacala and Socolow's concept of "stabilisation wedges",[2] adopting existing approaches to energy efficiency and conservation, fuel switching, renewable energy and energy storage, on a widespread basis across all sectors (including transport and the built environment), when combined with carbon capture and storage (CCS), nuclear power and improved land management and afforestation, will decrease, and then remove, our reliance on fossil fuels.

While fundamental research continues to be important, it is vital that we rapidly scale-up the use of existing technologies. All technologies – from renewables to CCS and nuclear – will need to play a part in decarbonising the global economy. The choices to be made in deciding between them are complex; in making these decisions, system-scale costs and interactions have to be fully considered and properly accounted for.

Meaningful action

For these technologies to be adopted on a widespread basis, governments need to reach an agreement at COP21 that provides the clarity, certainty and incentives to allow businesses, communities and individuals to act.

Governments, in any agreement, have to commit to a long-term carbon target – the UK is alone in the world in having a 2050 goal, whereas other countries look forward in intervals of only four to five years. Governments need to provide confidence in the long-term reliability of these targets – changing course every four or five years is profoundly unhelpful. Any agreement should also specify mechanisms for achieving these agreed targets, including a global carbon pricing system, offset agreements between governments and provisions enabling technology transfer.

If such an agreement can be reached in Paris, then the mitigation of climate change is a realistic goal.

Our message is simple: we must mitigate climate change and chemical engineering is part of the solution, but we must act now.

1. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, IPCC, 2014.
2. Pacala and Socolow, Science, vol 305, 5686, 968–972, 2004.

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