Communique to government departments and relevant stakeholders on Negative Emissions

Negative Emissions will be needed if we are to limit warming to 2°C or below. There is an urgent need for a national assessment to explore the potential of Negative Emissions Technologies (NETs) in the Australian context. This assessment should explore the effectiveness of different approaches, the potential for environmental co-benefits, risk assessments, economic opportunities, governance and legal frameworks, industry engagement, and social licence.

On October 30 and 31, 2018, the "**Negative Emissions Conference: Integrating Industry, Technology and Society for Carbon Drawdown"** was held at the Shine Dome, Canberra. It focussed the attention of the Australian policy, industry and academic communities on the need to explore and develop a new suite of approaches that contribute to efforts to address climate change: methods for enhancing the removal greenhouse gases from the atmosphere – also termed Negative Emissions.

Negative Emissions Technologies (NETs) are approaches that seek to remove greenhouse gases (mainly carbon dioxide) from the atmosphere or exhaust streams.[1] These strategies are sometimes referred to as Carbon Dioxide Removal or *CDR*.

A key message from the Conference is that:

"Even rapid decarbonization through emissions reduction will not be sufficient to stabilize climate at the global temperature thresholds of the Paris Agreement. To limit warming at 2 degrees or less requires NETs to draw down past and future emissions and store this carbon in land, ocean, and geological reservoirs. Our conference highlighted the urgency, global extent and potential cost of this challenge, but also revealed the opportunity to develop solutions that bring benefits to society, natural resources, ecosystems and the economy. Investments in the rapidly-emerging NETs sector have the potential to give Australia significant economic advantages, and Australia - through technological advances - can in turn provide leadership in addressing climate change."

Background

The (UNFCCC) Paris Agreement, explicitly stated that global warming, currently ~0.8°C, should be limited to well-below 2°C and efforts should be taken to limit warming to 1.5°C above pre-industrial levels. The Paris Agreement adopts a goal of "net zero emissions globally in the second half of the 21st Century" by achieving a balance between emissions sources and carbon sinks in the second half of this century. The agreement also calls upon parties to "take action to conserve and enhance as appropriate, sinks and reservoirs of greenhouse gases." The recent Intergovernmental Panel on Climate Change (IPCC) 1.5°C report and 5th Assessment Report highlighted that nearly all of the model simulation pathways used to inform development of the Paris Targets included NETs at scales far greater than currently deployed or allowed for under current policy settings. Furthermore, without NETs it would be virtually impossible to reach the Paris Target even if the Nationally Determined Contributions (from the Paris Agreement) were achieved.

In order for negative emissions to represent a significant 'partnership' with ongoing emissions reductions initiatives they would have to be deployed at unprecedented scales. Recent studies have highlighted that current NETs, despite their potential, are as yet, not sufficiently mature to be implemented at scale. Key questions exist around the efficacy and scalability of proposed NETs, their impact on the ecosystem services provided by land and ocean, human societies, strategies for adapting to a changing climate, and their governance.

Presently, Australia's CO_2 emissions comprise 3 roughly equal components: 1) electricity generation; 2) industry and direct combustion; and 3) transport, waste and agriculture/land use change. While the

[1] Negative Emissions Technologies are sometimes referred to as Carbon Dioxide Removal or "CDR" and are often discussed as part of a larger set of climate intervention or remediation strategies often referred to as "geoengineering." Geoengineering also includes strategies to counteract climate change by reflecting sunlight back into space through the use of sulphate aerosols injected into the stratosphere, "space mirrors" in orbit, or simply creating reflective surfaces such as white roofs. E.g. https://www.chiefscientist.gov.au/2012/04/ops1/

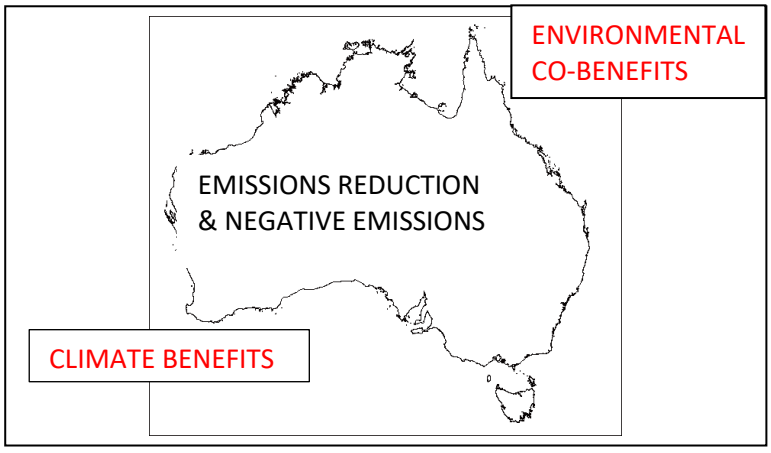
growth of renewable electricity is reducing Australia's electricity-sector CO_2 emissions, other sectors such as transport and agriculture sectors not readily offset by renewables. These emissions – for example aircraft flights - can only be offset through Negative Emissions.

Presentations at the Conference highlighted the urgent need for national and international consideration and dialogue around existing negative emission methods, testing of new technologies, and an upscaling of R&D on still-unproven technologies.

In Australia, CO_2 drawdown and storage is now achieved through the Federal Government's Emissions Reduction Fund (ERF), which funds methods such as native vegetation regrowth and reforestation. Near-term gains in CO_2 drawdown could be achieved through scaling up the methods supported in the ERF. Emissions reductions would need to be partnered with negative emissions to meet the Paris targets. NETs includes approaches that enhance already naturally-occurring processes and those that would apply technological approaches to NET. Land-based NETs include biochar soil enhancement, bioenergy with carbon capture and storage (BECCS) and enhanced weathering of silicate rocks. Marine approaches discussed at the Conference include: ocean alkalinisation and 'blue' carbon sequestration in salt marshes, mangroves, and seagrass beds. Direct capture of CO_2 from the atmosphere with carbon storage (DAC) is another emerging technology, though at present it is associated with high costs.

Clearly an assessment is urgently needed to gain understanding of suitable options for Australia, the potential efficacy of those options, and pathways for large-scale and cost-effective implementation.

Key to this assessment is the requirement for an interdisciplinary and policy-oriented approach that examines the capacity to upscale negative emissions technologies from laboratories and model simulations to landscapes, seascapes and geologic reservoirs.



As important as the technological issues covered by the Conference are, there are social issues raised by the prospect of NET, and several speakers focused on the social aspects of NET and the need to first obtain a social license to operate. To deploy NETs at the scales envisioned would require acceptance by industries and communities whose economic activities, environments and amenities may be affected by large-scale deployment of NETs.

Global and national governance and regulatory frameworks suited to the characteristics and risks of global-scale climate intervention are essential for implementation of NETs at the scales required. How would carbon injected into the deep ocean be tracked and "credited" in a context of multiple groups carrying out the activities? Who would be responsible for detrimental side-effects where tracking the sources of multiple interventions is difficult? Would communities' objections to local large-scale NET deployment be overruled in the interest of maintaining a safe global climate?

Along with these challenges, economic opportunities presented by NETs were also discussed at the Conference. For example, CCS requires the skills and technologies already present in the petroleum industry. Similarly, enhanced weathering would require the expertise of the mining and agricultural sectors, that together could provide negative emissions along with environmental co-benefits (soil fertilisation).

A further Conference is planned for mid-2019 in Canberra to explore how best to develop such a national assessment with policy, industry and academics. For further details contact Michael Ellwood or Philip Boyd (michael.ellwood@anu.edu.au; Philip.boyd@utas.edu.au).