Frequently Asked Questions (FAQs)

FAQ 7.1 | Why is the Agriculture, Forestry and Other Land Uses (AFOLU) sector unique when considering GHG mitigation?

There are three principal reasons that make the AFOLU sector unique in terms of mitigation:

In contrast to other sectors, AFOLU can facilitate mitigation in several different ways. Specifically, AFOLU can (i) reduce emissions as a sector in its own right, (ii) remove meaningful quantities of carbon from the atmosphere and relatively cheaply, and (iii) provide raw materials to enable mitigation within other sectors, such as energy, industry or the built environment.

The emissions profile of AFOLU differs from other sectors, with a greater proportion of non-CO_2 gases (N_2O and CH_4). The impacts of mitigation efforts within AFOLU can vary according to which gases are targeted, as a result of the differing atmospheric lifetime of the gases and differing global temperature responses to the accumulation of the specific gases in the atmosphere.

In addition to tackling climate change, AFOLU mitigation measures have capacity, where appropriately implemented, to help address some critical, wider challenges, as well as contributing to climate change adaptation. AFOLU is inextricably linked with some of the most serious challenges that are suggested to have ever faced humanity, such as large-scale biodiversity loss, environmental degradation and the associated consequences. As AFOLU concerns land management and utilises a considerable portion of the Earth's terrestrial area, the sector greatly influences soil, water and air quality, biological and social diversity, the provision of natural habitats, and ecosystem functioning, consequently impacting many SDGs.

FAQ 7.2 | What AFOLU measures have the greatest economic mitigation potential?

Economic mitigation potential refers to the mitigation estimated to be possible at an annual cost of up to USD100 tCO_2^{-1} mitigated. This cost is deemed the price at which society is willing to pay for mitigation and is used as a proxy to estimate the proportion of technical mitigation potential that could realistically be implemented. Between 2020 and 2050, measures concerning forests and other ecosystem are estimated to have an average annual mitigation potential of 7.3 (3.9–13.1) $GtCO_2$-eq yr^{-1} at USD100 tCO_2^{-1}. At the same cost, agricultural measures are estimated to have a potential of 4.1 (1.7–6.7) $GtCO_2$-eq yr^{-1}. Emerging technologies, such as CH_4 vaccines and inhibitors, could sustainably increase agricultural mitigation potential in future. The diverted production effects of changes in demand (reduced food losses, diet changes and improved and enhanced wood products use), is estimated to have an economic potential of 2.2 (1.1–3.6) $GtCO_2$-eq yr^{-1}. However, cost forms only one constraint to mitigation, with realisation of economic potential dependent on multiple context-specific environmental and socio-cultural factors.

FAQ 7.3 | What are potential impacts of large-scale establishment of dedicated bioenergy plantations and crops and why is it so controversial?

The potential of bioenergy with carbon capture and storage (BECCS) remains a focus of debate with several studies evaluating the level at which BECCS could be sustainably implemented, published since AR5. BECCS involves sequestering carbon through plant growth (i.e., in trees or crops) and capturing the carbon generated when this biomass is processed for power or fuel. The captured carbon then requires long-term storage in for example, geological, terrestrial or ocean reservoirs, or in products. While appearing to create a net removal of carbon from the atmosphere, BECCS requires land, water and energy which can create adverse side effects at scale. Controversy has arisen because some of the models calculating the energy mix required to keep the temperature to 1.5°C have included BECCS at very large scales as a means of both providing energy and removing carbon from the atmosphere to offset emissions from industry, power, transport or heat. For example, studies have calculated that for BECCS to achieve 11.5 $GtCO_2$-eq per year of carbon removal in 2100, as envisaged in one scenario, 380–700 Mha or 25–46% of all the world's arable and cropland would be needed. In such a situation, competition for agricultural land seriously threatens food production and food security, while also impacting biodiversity, water and soil quality, and landscape aesthetic value. More recently however, the scenarios for BECCS have become much more realistic, though concerns regarding impacts on food security and the environment remain, while the reliability of models is uncertain due to methodological flaws. Improvements to models are required to better capture wider environmental and social impacts of BECCS in order to ascertain its sustainable contribution in emissions pathways. Additionally, the opportunity for other options that could negate very large-scale deployment of BECCS, such as other carbon dioxide removal measures or more stringent emission reductions in other sectors, could be explored within models.