

The Role of Agricultural Science and Technology in Climate 21 Project Implementation



[Agriculture and forestry](#) are the only sectors that have the potential to be a net sink for greenhouse gases (GHG)

because of the ability to sequester carbon in soil and plants and reduce methane and nitrous oxide emissions.

- Forests and stable grasslands are well known carbon sinks because they can store large amounts of carbon in their vegetation, root systems and the organic matter which accumulates in undisturbed soils
- By adopting tillage practices that minimize soil disturbance and the use of cover crops, farmers can improve soil health, greatly reduce erosion, and have greater resilience during droughts while at the same time making an important contribution to the mitigation of climate change.

The current climate crisis presents a unique set of challenges and opportunities for [animal agriculture](#).

- Increasing feed efficiency or the feed conversion ratio by all food animal species provides opportunities to reduce nitrous oxide, carbon dioxide, and methane emissions while improving the use of natural and financial resources and the production of nutritious foods by animal agriculture.
- Biophysical research to explore and develop new sensing technology or new uses for existing technology is fundamental for accurate and robust measurement of both the emissions and mitigation of GHGs.

Cutting-edge [agricultural technologies](#) can positively influence the carbon cycle by reducing the net amount of fossil fuels consumed in production and by increasing the amount of CO₂ that plants convert to stored biomass.

- Improved precision through automatic guidance saves fuel and inputs (e.g., fertilizer or pesticide), particularly when combined with variable rate applications.
- Improving crop plants to contend with climate change involves developing plants that are more capable in multiple respects: resilience to climatic effects, ability to sequester carbon in the soil, and ability to rapidly build carbonaceous biomass above ground that may be used as a source of energy or materials to replace fossil fuels.

Greenhouse gas emissions attributed to [food loss and waste](#) (FLW) account for 8–10% of global anthropogenic emissions making it the third largest emitter behind China and the United States if FLW was a country.

- Aerobic composting and anaerobic digestion are popular alternatives to landfilling for managing food waste. AC and AD help mitigate climate burdens by reducing landfill methane emissions as well as through life-cycle carbon reductions via fertilizer and/or energy substitution.
- Food waste can be made into highly nutritious feed for livestock.

[Carbon markets](#) began approximately 25 years ago to help mitigate emissions across national boundaries and in sectors with lower cost mitigation opportunities.

- Carbon credits from agriculture can be generated by increasing soil carbon sequestration (termed as “removals” in carbon markets, due to the ability of soils to remove carbon dioxide from the atmosphere) and from reduced emissions of GHG (termed as “reductions” in carbon markets), including from nitrous oxide and methane.

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