

Improving environmental outcomes using Smart Sensor Technology

Like many sectors, agriculture is coming under increasing pressure to modify its practices and contribute to tackling the Climate Emergency – all the while guaranteeing sustainable food production. Targeted use of sensors and internet of things (IoT) technologies has the potential to support this transition, both in providing data to inform and quantify the impact of best practice and to develop new ways of working.

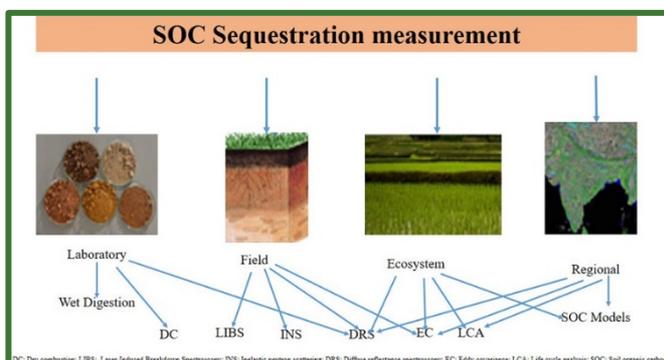
The Climate Emergency requires that our food and farming systems must rapidly adapt to new methods of working that are leaner, greener and data driven. Critically, there is a requirement that Scottish agriculture positively steps up to the climate challenge and contributes towards our nation's ambitious targets of reducing GHG emissions by 75% by 2030 and become net-zero by 2045.

Without the adoption of digital tools and smart use of data, Scottish agriculture will not be able to act as quickly or as effectively in modifying systems to become more efficient and climate friendly. Scotland is already lagging other nations in exploring the potential of LoRaWAN sensor systems for improving farming enterprises. Potential areas where sensor technologies can be used to support environmental outcomes include:

Livestock Health – Reduction in GHG through demonstrable improvements in livestock health as directed by sensor data points. Examples include – monitoring of vaccine fridges to ensure efficacy; monitoring of housing conditions to alert to conditions that might lead to negative health outcomes; monitoring of water usage to alert to health conditions; and monitoring of movement via GPS to provide mobility insights.

Nutrient Management – Significant GHG abatement opportunities are available through better, more targeted use of nitrogenous fertilisers. Data farm soil temperature and moisture sensors can be used to inform application timings, which offer a clear and substantive opportunity for improvements in nutrient uptake and a reduction in losses to the environment.

Reducing Food Losses – Limiting food losses within primary agriculture, associated with poor management practices, offers a significant opportunity to reduce emissions attributable to each unit of output. LoRaWAN sensors monitoring building and product parameters are currently active in grain and potato stores, enabling early alerts to temperature anomalies and the elevated risk of spoilage.



Improvement in Grazing Management – There is a significant and realisable opportunity to use technology to improve grassland management in livestock systems – improving the ability of soils to sequester and store carbon as well as improving cattle performance.

Monitoring & Management of Farm Woodland – Agroforestry is identified in the Scottish Government's Climate Change Plan as an area

where expansion and an improvement in the management of this resource could lead to substantially improved environmental outcomes. Sensor technologies offer opportunities for improved data quality and the unlocking of better management insight, and decision making with respect to productivity, efficiency, and the carbon sequestration potential of farm woodland.