

**EPA STRIVE Programme 2007-2013**

# **Quantification of the components of the carbon budget at farm scale**

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## **Executive Summary**

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Prepared for the Environmental Protection Agency

by

Centre for Hydrology, Micrometeorology and Climate Change,  
Department of Civil and Environmental Engineering,  
University College Cork

**Authors:**

**Kenneth A. Byrne, Ger Kiely**

**ENVIRONMENTAL PROTECTION AGENCY**  
An Ghníomhaireacht um Chaomhnú Comhshaoil  
PO Box 3000, Johnstown Castle, Co.Wexford, Ireland  
Telephone: +353 53 916 0600 Fax: +353 53 916 0699  
Email: [info@epa.ie](mailto:info@epa.ie) Website: [www.epa.ie](http://www.epa.ie)

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## **EPA STRIVE PROGRAMME 2007-2013**

## **Details of Project Partners**

**Name 1**            **Kenneth A. Byrne**  
Address            Centre for Hydrology, Micrometeorology and Climate Change,  
                         Department of Civil and Environmental Engineering  
                         University College Cork  
Tel.:                021 4903025  
E-mail:             k.byrne@ucc.ie

**Name 1**            **Ger Kiely**  
Address            Centre for Hydrology, Micrometeorology and Climate Change,  
                         Department of Civil and Environmental Engineering  
                         University College Cork  
Tel.:                021 4902965  
E-mail:             g.kiely@ucc.ie

## **Executive Summary**

Grassland is the dominant land use in Ireland. There is a need to understand the carbon (C) sequestration status of these ecosystems in order to support national commitments under the United Nations Framework Convention on Climate Change and its Kyoto Protocol. This study investigated the farm scale C balance at the Celticflux study site in Co. Cork, Ireland. Carbon dioxide (CO<sub>2</sub>) fluxes were compared in new and permanent grassland using a chamber based experiment. Cumulative values of gross primary production (GPP), total respiration (R<sub>TOT</sub>) and net ecosystem exchange (NEE) in the new grassland were 2.14, -1.98 and 0.15 kg C m<sup>-2</sup> yr<sup>-1</sup> respectively. In the permanent grassland cumulative values of GPP, R<sub>TOT</sub> and NEE were 2.90, -2.52 and 0.38 kg C m<sup>-2</sup> yr<sup>-1</sup> respectively. R<sub>TOT</sub> was partitioned into heterotrophic (R<sub>H</sub>) and autotrophic respiration (R<sub>A</sub>). During the period from late May until mid-August R<sub>H</sub> and R<sub>A</sub> both accounted for, on average, 50% of R<sub>TOT</sub>. During the rest of the year R<sub>H</sub> and R<sub>A</sub> represented, on average, 62 and 38% of R<sub>TOT</sub> respectively. The farm scale C balance was quantified by combining results of on-site eddy covariance studies with farm management data and emission factors derived from published literature. This assessment found that grassland is a sink for ~2 t C ha<sup>-1</sup> yr<sup>-1</sup>. There is a need for further research to partition this sink between the amounts sequestered in the soil and the vegetation. There is also a need to quantify the major components of the farm C balance and to upscale site level studies to regional and national level.