

Environment and Rural Affairs Monitoring & Modelling Programme (ERAMMP)

ERAMMP Report-68 Technical Annex 1: Response to query raised for Wales Land Use and Land Use Change GHG Emissions Inventory.

**Query: Why are there differences between report 68
emissions figures and some other emissions figures?**

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Abbreviations Used in this Report

CARBINE	Forest Research Carbon Accounting model
DA	Devolved administration
ECOSSE	Estimating Carbon in Organic Soils – Sequestration & Emissions model
GHG	Greenhouse Gas

Abbreviations and some of the technical terms used in this report are expanded on in the programme glossaries: <https://erammp.wales/en/glossary> (English) and <https://erammp.cymru/geirfa> (Welsh)

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1 Introduction

In response to the query about the LULUCF inventory emission figures, the Annual reports published at UK Greenhouse Gas Inventory¹ and previous reports have been reviewed.

In ERAMMP Report 68, the latest available report was used, this being the report for 2018 – published in September 2020. Table 1.1 compares the emission estimates in the 2020 report with revised emission estimates in the report published in September 2022.

Table 1.1 Comparison of the emission estimates in the 2020 report with the latest report published in September 2022

Indirect N ₂ O	22.74	16.6
Forest drainage	-	17.0
Forest remaining Forest	-1209.74	-1331.8
Other land categories converted to forest	17.95	17.8
Cropland remaining cropland	412.52	197.6
Grassland converted to cropland	463.62	475.5
Grassland remaining grassland	-278.96	76.3
Forest converted to grassland	100.69	73
Cropland converted to grassland	-253.91	-161
Wetlands and land converted to wetlands	-	- 9.7
Settlements converted to grassland	-98.13	- 80.4
Settlements remaining settlements	289.89	185.1
Forest converted to settlements	22.29	56.3
Cropland converted to settlements	24.49	29.2
Grassland converted to settlements	363.09	108.2
Harvested Wood Products	-296.00	-274.4
Total	-444	-653.4

Note: negative figures are GHG removals (sequestration) and positive figures are emissions

¹ https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2206220830_ukghgi-90-20_Main_Issue1.pdf

2 Why the difference?

The GHG inventory methodology has been updated in two main ways – see Annex 3 of UK Greenhouse Gas Inventory 1990-2020.²

2.1 Updated estimates of areas of land use and land management.

A new method using Bayesian Data assimilation has replaced an earlier method based on Countryside Surveys, now outdated since the last survey in 2007. At the time of the 2010 report on climate change mitigation for agriculture and land use, we were critical of this approach because it was based on decadal assessments of land use change. The new method uses a wide range of data sources to provide annual estimates.

Also for wetland drainage and rewetting accounting, new maps of peat soils have been created. These maps were combined with a forest map to give areas of conifer and broadleaf forests planted on organic soils. These total areas were assigned to individual afforestation years by adjusting the previously applied the distribution of organic soil areas. An analysis of recent grant-aided new planting on organic soils and implementation of policies against planting on organic soils in each of the DAs.

Another change is moving from independent annual matrices of land-use change to vectors of land use change (which improves the representation of rotation management of cropland and improved grassland).

2.2 Carbon flows in forests and soils are modelled using the Forest Research CARBINE model.

A new CARBINE Soil Carbon Accounting model (SCOTIA), based on a simplified version of the ECOSSE model coupled with a litter decomposition model derived from the ForClim-D model has been developed. This allows parameterisation of litter input from ground flora and other non-forest vegetation.

The emission estimates are based on a combination of data on land use / land use change with the emissions/unit area estimated by CARBINE/ECOSSE models.

² https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2206220831_ukghgi-90-20_Annex_Issue1.pdf

3 Summary

The Table shows some significant changes in the component sources/sinks as a result of these changes of methodology. The new methods are supposed to be applied to the data back to the baseline year of 1990, but we think that the land use data may be inadequate to do this

The Welsh Government summary figures come from The Second All Wales Low Carbon Delivery Plan (2021-2025)³, but is worth noting the units should be kt not Mt.

³ <https://www.gov.wales/sites/default/files/publications/2021-10/net-zero-wales-carbon-budget-2-2021-25.pdf>

4 References

Prosser, H. (2022). ERAMMP Report-68: Review of GHG Emission Reduction and Carbon Sequestration in Agriculture to Inform Agricultural and Land Use Policy. Report to Welsh Government (Contract C210/2016/2017)(UKCEH 06297/06810)

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