

<b>Title</b>	<b>Wise use of peatlands in a bio-based economy (PEATWISE)</b>
<b>Project Timeframe</b>	Sep 2017 – Sep 2020
<b>Countries Involved</b>	New Zealand (University of Waikato) Denmark (Aarhus University) Finland (University of Oulu, University of Eastern Finland) Germany (Leibniz Centre for Agricultural Landscape Research) Netherlands (Radboud University) Norway (Norwegian Bioeconomy Research Institute) Sweden (Swedish University of Agricultural Sciences)
<b>Aim</b>	To test ways to improve the management of agricultural peatlands in order to minimise GHG emissions while maintaining biomass production.
<b>Research Highlights</b>	<ul style="list-style-type: none"> <li>• Compared the CO<sub>2</sub> emissions of two neighbouring dairy farms with different drainage management on a drained Waikato peatland, during a one-year period with a very dry late summer and autumn.</li> <li>• Found that there were very large differences in CO<sub>2</sub> emissions yet only minor differences in water table depths between the research sites.</li> <li>• Differences in peat soil physical properties affecting subsurface moisture redistribution under dry conditions allowed continued microbial peat decomposition at one site while limiting it at the other.</li> <li>• Made the first full-GHG flux measurements (CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub>) at hectare scales for a New Zealand (Waikato) dairy farm on deep drained peat, over one year.</li> <li>• N<sub>2</sub>O emissions were smaller than the IPCC Tier 1 emission factor for deep-drained nutrient-rich peatland.</li> <li>• Overall GHG emissions at the two sites were 16.5 and 42.6 t CO<sub>2</sub>-eq ha<sup>-1</sup> y<sup>-1</sup>, with CO<sub>2</sub> emissions contributing 50% and 75% of the totals.</li> <li>• Recommended New Zealand to use IPCC 2013 emission factors for GHG emissions from drained peatlands, and stratify peatland areas by nutrient status to refine N<sub>2</sub>O emission estimates.</li> <li>• Contributed to the <a href="#">PEATWISE</a> consortium of researchers, from research organisations based in Norway, Sweden, Finland, the Netherlands, Denmark, and Germany.</li> </ul>
<b>Future Work</b>	<ul style="list-style-type: none"> <li>• Undertake further research to investigate: <ul style="list-style-type: none"> <li>- What farm management practices lead to differences in peat soil properties responsible for large contrasts in CO<sub>2</sub> emissions under seasonal dry/drought conditions?</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>- What is the effect of cultivation and liming on CO<sub>2</sub> and N<sub>2</sub>O emissions?</li> <li>- What is the source of CH<sub>4</sub> from pasture soils?</li> <li>• Further work is required to develop country-specific emissions factors based on peatland type and land use intensity.</li> <li>• Develop and test Tier 2 approaches to calculate N<sub>2</sub>O emissions factor for peat mineralisation.</li> <li>• A larger programme on peatland restoration research is being developed in partnership with Manaaki Whenua-Landcare Research, to look at the feasibility to rewet and ecologically engineer degraded drained peatlands to create efficient GHG sinks.</li> </ul>
<p><b>Key Research Output(s)</b></p>	<p><u>Journal article(s)</u></p> <p>Campbell, D.I., Glover-Clark, G.L., Goodrich, J.P., Morcom, C., Schipper, L.A., Wall, A.M. (Submitted). Large differences in CO<sub>2</sub> emissions from two dairy farms on a drained peatland driven by contrasting respiration rates during seasonal dry conditions. <i>Science of the Total Environment</i>.</p> <p>Campbell, D.I., Wall, A.M., Glover-Clark, G.L., Goodrich, J.P., Morcom, C., Schipper, L.A. (In Prep.). Greenhouse gas balances for two dairy farms on a deeply-drained peatland. <i>Agriculture, Ecosystems &amp; Environment</i>.</p> <p><u>Conference presentation(s)</u></p> <p>Campbell, D.I., Glover-Clark, G.L., Goodrich, J.P., Morcom, C., Schipper, L.A., Wall, A. CO<sub>2</sub> emissions from drained peatlands. <i>New Zealand Agriculture Inventory Workshop</i>. 31 March 2020.</p> <p>Campbell, D.I., GHG emissions from grazed pastures on a drained peatland. <i>OzFlux 20<sup>th</sup> Anniversary Conference</i>. 16-17 July 2020 (online).</p>