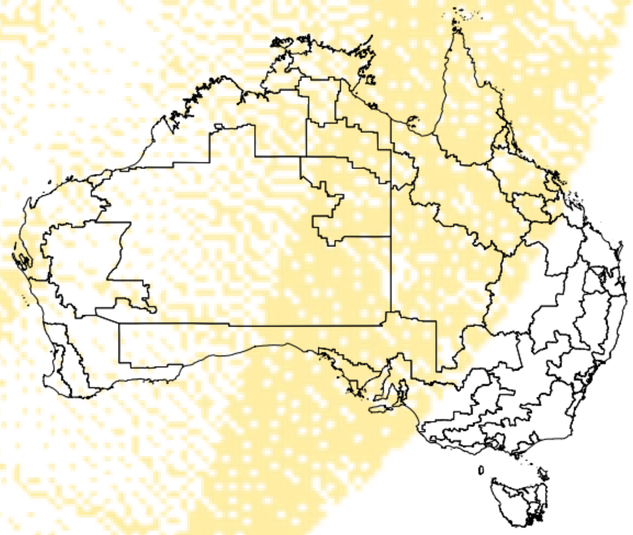
Regionalised LCI for Australian agriculture



Background

Agricultural life cycle inventory (LCI) data underpin Scope 3 greenhouse gas reporting. Global databases often rely on national-average emission factors that do not reflect the diversity of regional soils, climates, and farming practices. The Australian Life Cycle Inventory (**AusLCI**) addresses this through a regionalised bottom-up modeling approach. Here, we use wheat as a case study to demonstrate advancements in regional LCI to better support the industry by reflecting real-world farming practices.

Key regionalised updates

1. N leaching and runoff Regional FracWet modelling from the latest national inventory method.	**2. In focus · Biological N fixation updated model of N fixation; fixed N allocated as a co-product of legume crops.**
3. Tillage intensity Regional low-till and no-till adoption rates drawn from farm surveys.	4. Lime demand Theoretical demand from Net Annual Acidification Rate (NAAR).

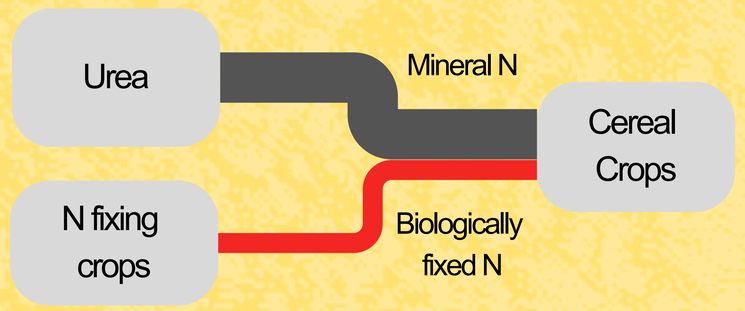
In focus: Biological N fixation

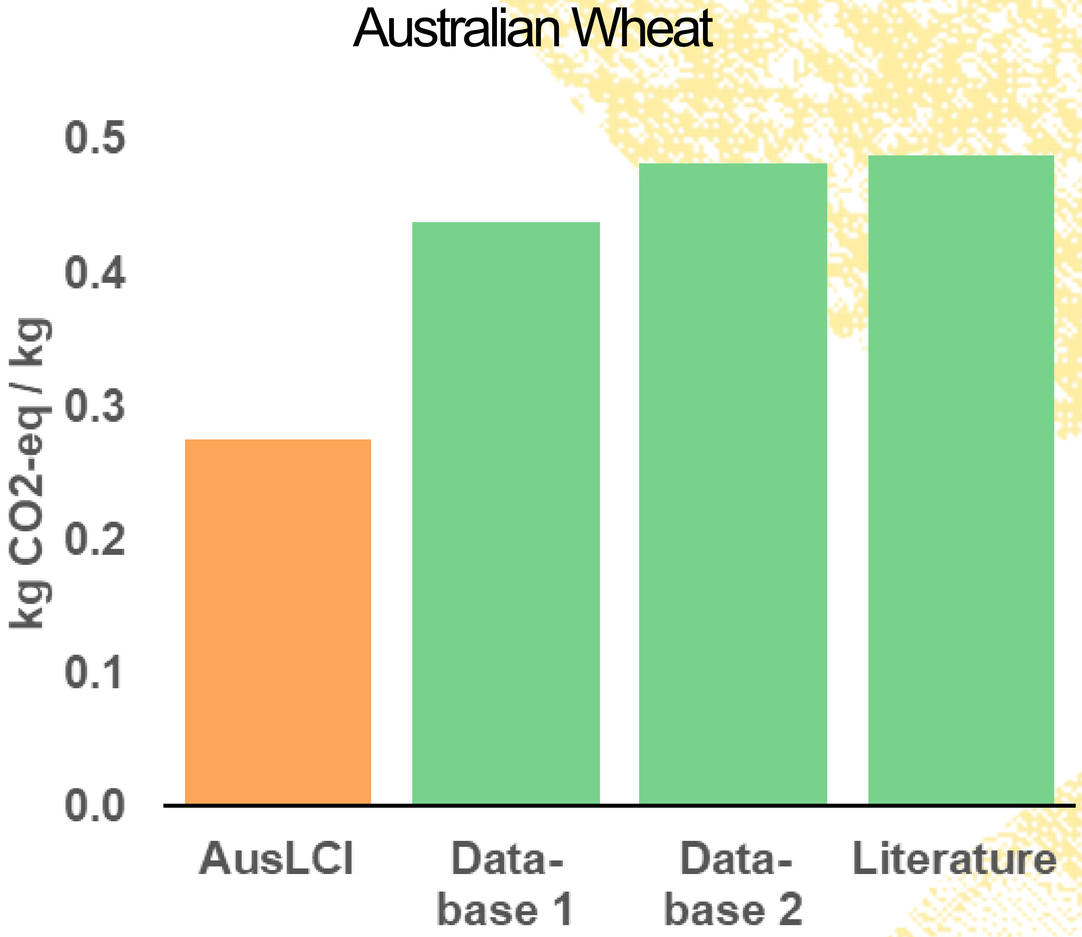
Previous approach
N fixed by legumes is credited to the legume crop via a negative mineral N flow.

Updated approach
Fixed N is modelled as a co-product of legumes and pulse crops, entering a regional soil N market, available to other crops in rotation.

On average 11% of cereal N demand is met from biological fixation - but this ranges from 1% to almost 35% aross regions.

Affects mineral N demand for non-legume crops in the rotation, with flow-on reductions in direct and indirect N_2O emissions and demand for urea.





Result

Aggregated across all regions, the climate change impact of Australian wheat in AusLCI is up to 40% lower than comparable global databases.

Take away

Without regionalisation, some countries are poorly represented in global databases. AusLCI addresses this by using national emission factors, and regionalised climate variables and on-farm activities. The biological N fixation model is one example, where modelling fixed N as an output into an N market produces data that better reflects what practitioners recognise. The result is data that is both more accurate and meaningful for industry users.