

Indicator 3: Soil nitrogen balance

Rationale: the soil nitrogen balance is a high level indicator of potential environmental pressure providing a measure of the total loading of nitrogen on agricultural soils. Whilst a shortage of nutrients can limit the productivity of agricultural soils, a surplus of these nutrients poses a serious environmental risk. The balances do not estimate the actual losses of nutrients to the environment (e.g. water or air) but significant nutrient surpluses are directly linked with losses to the environment.

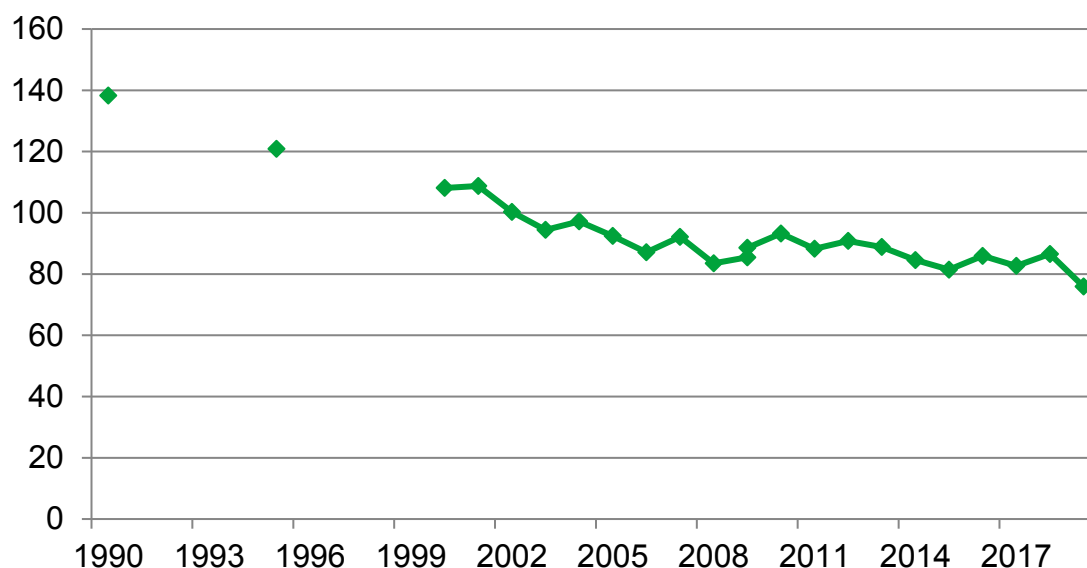
Indicator: soil nitrogen balance per hectare of managed land (England).

Desired outcome: all other things being equal, more efficient use of manufactured and organic nitrogen fertiliser will result in a declining nitrogen balance (or surplus) which will in turn lead to a reduced risk of nitrous oxide emissions and other environmental pressures (reducing the surplus can benefit all impacts and is more efficient than trying to prevent losses, which can lead to pollution swapping).

Current status	Long term: (last 10 years) ✓	Short term: (last 2 years) ✓
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Soil nitrogen balance per hectare of managed agricultural land, England

Kilogrammes N per hectare



Break in series in 2009

Source: Defra Statistics

The nitrogen surplus in England has fallen by 30% since 2000. The main drivers have been reductions in the application of inorganic fertilisers (particularly to grass) and manure production (due to lower livestock numbers), partially offset by a reduction in the nitrogen offtake (particularly forage).

In the shorter term, provisional figures for 2019 show that the nitrogen balance decreased by 12% when compared to 2018. This has been mainly driven by a combination of an 8.7% increase in overall offtake (mainly via harvested crops) and a 0.8% decrease in inputs. The increase in offtake reflects a significant increase in overall harvested production compared to 2018.

Data sources

The soil nitrogen balances are Official Statistics calculated using survey data and coefficients from a wide range of sources. The survey data utilised include: the June Survey of Agriculture, the Cereal Production Survey (both National Statistics), the British Survey of Fertiliser Practice and various commodity production surveys.

A full list of data sources can be found on the Agri-environment [website](#).

Indicator methodology

The methodology for calculating the soil nutrient balances has been developed by OECD¹ and adopted by Eurostat². Soil nutrient balances provide a method for estimating the nutrient loadings of nitrogen and phosphorus to managed³ agricultural soils. The approach estimates the full range of nutrient inputs to and removals (offtakes) from soils from all sources. The input sources are: manures, mineral fertilisers, atmospheric deposition and biological fixation. The removals sources are: crop production and fodder for livestock, including grazing. The nutrient input or removal from each source is either estimated directly (e.g. atmospheric deposition) or calculated by applying a coefficient (e.g. for the amount of nitrogen that a dairy cow produces each year) to the corresponding physical data characteristic (e.g. number of dairy cows). The relevant coefficients are derived from research and the physical data is taken from a wide range of data sources many of which are already published as official statistics.

The break in the series in 2009 is a result of methodological changes⁴ to Defra's June Survey. The estimates presented here utilise the June Survey data for all holdings until 2009 and for commercial holdings only from 2009 onwards. Data for 2009 are presented on both bases to aid comparisons. The soil nitrogen balance is updated on an annual basis.

Further information on the nutrient balances [website](#).

¹ Organisation for Economic Cooperation and Development.

² Eurostat is the Statistical body of the European Commission.

³ Managed agricultural land excludes common and rough grazing.

⁴ See <https://www.gov.uk/guidance/structure-of-the-agricultural-industry-survey-notes-and-guidance> for further information.