

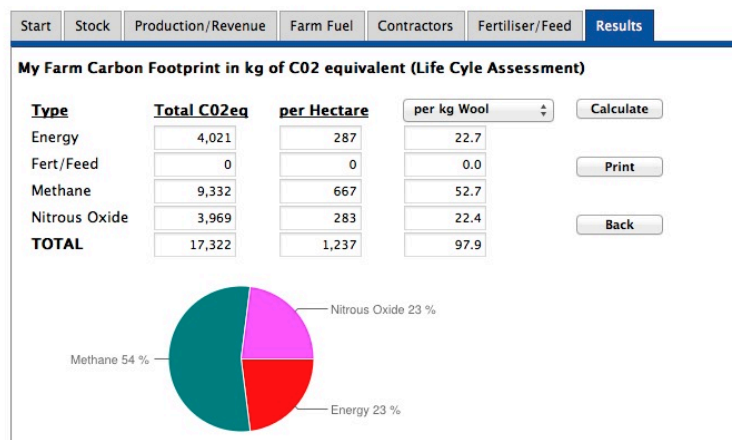
An assessment of the greenhouse gas emissions for Quarantine Island/ Kamau Taurua

Quarantine Island is a 14 hectare island in Otago Harbour. It is owned by the NZ government and designated a recreation reserve. It is administered by the Department of Conservation. The Department signed a joint management agreement for a renewable 5 year term with the Quarantine Island/Kamau Taurua Community Inc in 2010. This agreement replaced the expired grazing license. QI/KT graze sheep on the island as an interim measure until reforestation occurs, stock numbers will be reduced as more of the island is returned to native plant cover. QI/KT owns and manages a cottage for the resident and a lodge for guests both with electricity, access is by boat.

Greenhouse gas (GHG) Emissions

The main sources of emissions are estimated. There were approximately 40 sheep in 2012. In 2011-2012 the sheep produced 177 kg wool. There is estimated use of 100 l petrol for the boat, mower and weed eater. Approximately 14,400 kwh electricity is used in total by the Lodge and Cottage.

Carbon Calculator for New Zealand Agriculture and Horticulture



Total emissions: 17.322 tonnes (t) of CO₂ equivalent, over half as methane as shown in the figure. This was determined using the Lincoln University Carbon Calculator.

About 3/4 of the Island's GHG emissions come from the sheep (0.332 t per sheep) as Methane and Nitrous Oxide, and most of the remaining 1/4 from the electricity (Energy) used for the resident and guests. However, the fuel is an underestimate as most visitors come on a larger boat with unknown fuel use and 100 l of fuel 'only' produces 0.275 t of GHG (a little less than a sheep). A ten-fold higher value, 1000 l of petrol or diesel, would add about 3 t to these emissions (This 3 t would be 15% of 20 t).

Sequestration

Trees and grass take CO₂ from the atmosphere and sequester it. There are about 4 hectares of low coastal native bush on the island, 9.5 of grass and 0.5 hectares of mature pines, macrocarpas and eucalyptus.

The grass does not sequester much - about 2 t per year ($9.5 \times 0.233 = 2.21$). Low coastal bush sequesters up to about 37 t per year ($4 \times 9.2 = 36.8$), and the large exotic trees 9 t per year ($0.5 \times 18 = 9.0$). So overall 48 t CO₂ per year.

This sequestration calculation uses figures for carbon sequestration rates per year from the MPI NZ, for example 18 t CO₂/ha/yr for 'Planted Forests' during rapid growth phases. The carbon calculator provided by Landcare NZ for manuka/kanuka Kyoto afforestation schemes estimates just 1.2 tCO₂/ha/yr at year 2, 8.6 at year 10, peaking at 10.5 at year 15.

However, the island is better than carbon neutral, currently sequestering more than the emissions!

Reducing emissions to 10-20% below 1990 levels by 2020.

Is the Island on track to meet NZ's target for Kyoto? Sheep are the largest source of emissions. In 1990 there were probably about the same number of sheep as in 2012, perhaps a few more. So emissions will have reduced a little if sheep numbers are much less in 2020.

Since 1990 there has been considerable planting of native trees, about an extra two hectares, so an increase in sequestration. These forests planted since 1990 count for Kyoto but trees are as yet mainly very small, many less than 2 years old in 2012, but will be sequestering carbon well by 2020. Thus SMIC and Quarantine Island is probably on target to reduce greenhouse gas emissions by sequestering them by 2020.

Chris Brown, PhD
Senior Lecturer, Biochemistry
University of Otago
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