

# ARE WE TURNING A BRIGHTER SHADE OF GREEN?



## An Executive Summary of Working Paper 15-06

Corey Allan, Suzi Kerr, and Campbell Will.

Motu Economic and Public Policy Research,

corey.allan@motu.org.nz, suzi.kerr@motu.org.nz, campbell.j.will@nz.pwc.com

## SUMMARY HAIKU

Are kiwis more green?  
Just a tiny bit, but then  
there's much more to do.

## INTRODUCTION

Households are usually unaware of the full environmental impact of the goods and services they buy. The production of these goods requires energy, and energy production results in CO<sub>2</sub> emissions. Production may also involve a chemical reaction that is another source of greenhouse gas emissions (GHGs) e.g. methane produced by livestock. We calculate the amount of GHGs created in producing the goods and services we all consume, and ask the question “Are New Zealand households becoming greener?” The simple answer is “yes, slightly, but we could be doing more.”

The researchers at Motu hope this paper provides useful information to households looking to reduce their environmental footprint. It shows that small shifts in spending patterns, such as spending less on meat and dairy or less on transport in general, could have a relatively large effect on emissions. However, the most important determinant of a household's emissions is its total expenditure (income) and the size and composition of the household.

## METHODOLOGY

Emissions occur at all stages of production, from the extraction and processing of raw materials to the final distribution of finished products to retail stores. Our methodology measures emissions embodied in the goods we all consume. This consumption approach tracks products throughout the production process and accounts for emissions that occur at all stages of production.

Our methodology for calculating emissions differs from the approach of the Ministry for the Environment (MfE)<sup>1</sup>, which calculates emissions based on where the emissions actually occur e.g. where the fuel is burned, where the cows are located etc. This approach is referred to as the production or territorial approach.

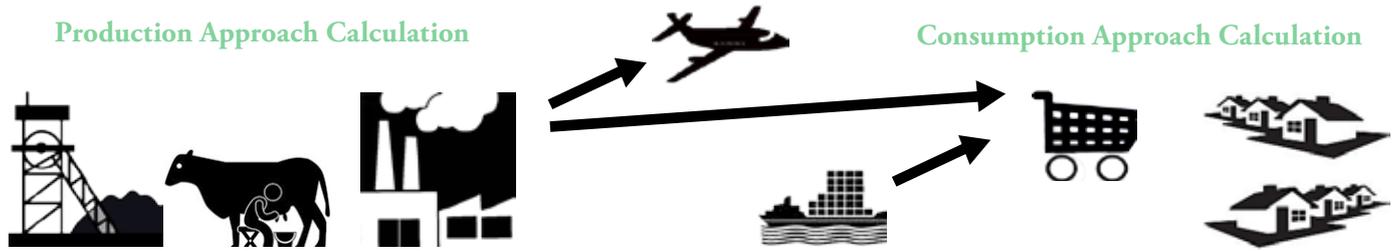
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<sup>1</sup>MfE reports New Zealand's emissions under the United Nations Framework Convention on Climate Change (UNFCCC).



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**COREY ALLAN**  
MOTU RESEARCH ANALYST

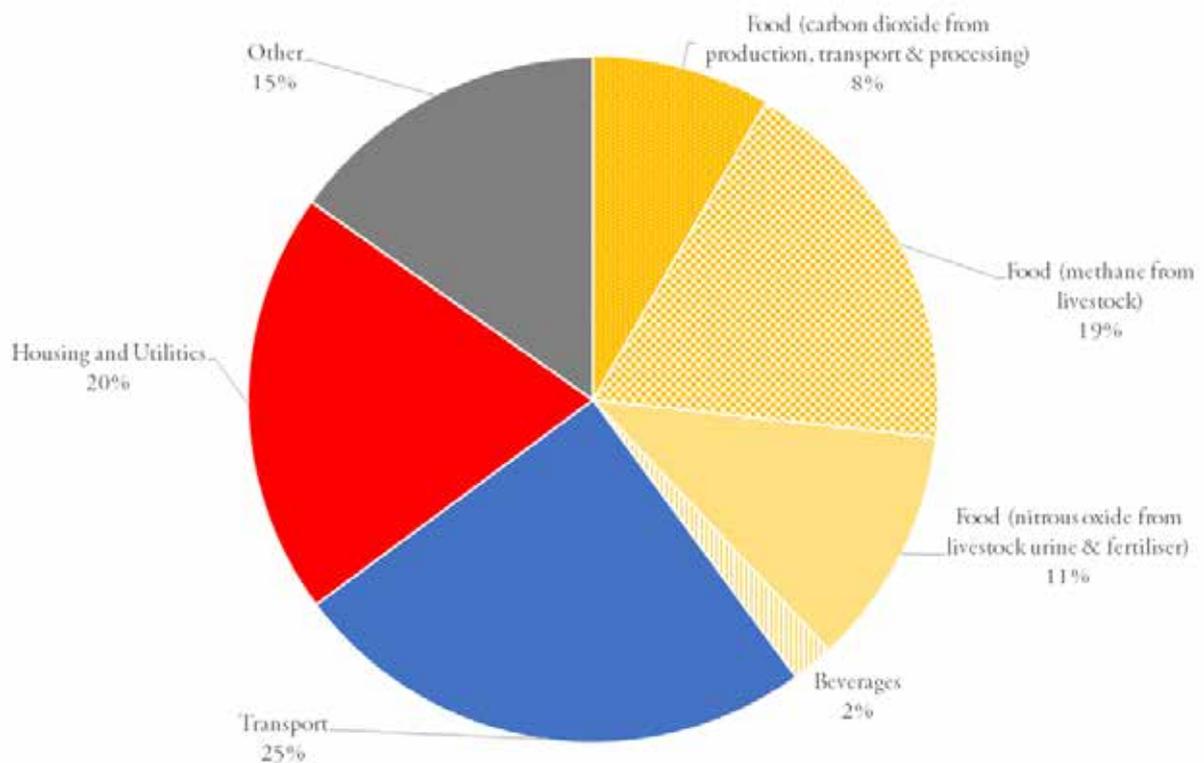


The main difference between the two approaches is the treatment of exports and imports. MfE includes emissions generated in the production of goods and services for export, and excludes emissions from the production of imported goods. Our approach excludes the emissions generated to produce goods for export, but includes the emissions from imported goods.

### MAKE UP OF HOUSEHOLD EMISSIONS

Food, housing utilities, and transport account for 82 percent of the emissions for the average household. These categories are also emissions intensive, meaning that more emissions result from producing an extra unit of these goods. Only 20 per cent of emissions from food are energy emissions, emissions from the burning of fossil fuels. The other 80 per cent of emissions are methane from livestock and nitrous oxide mostly from animal urine. Household energy (electricity, gas, solid fuels) accounts for the bulk of emissions from household utilities, while petrol and diesel are the most important sources of emissions from transport.

### Composition of average household emissions



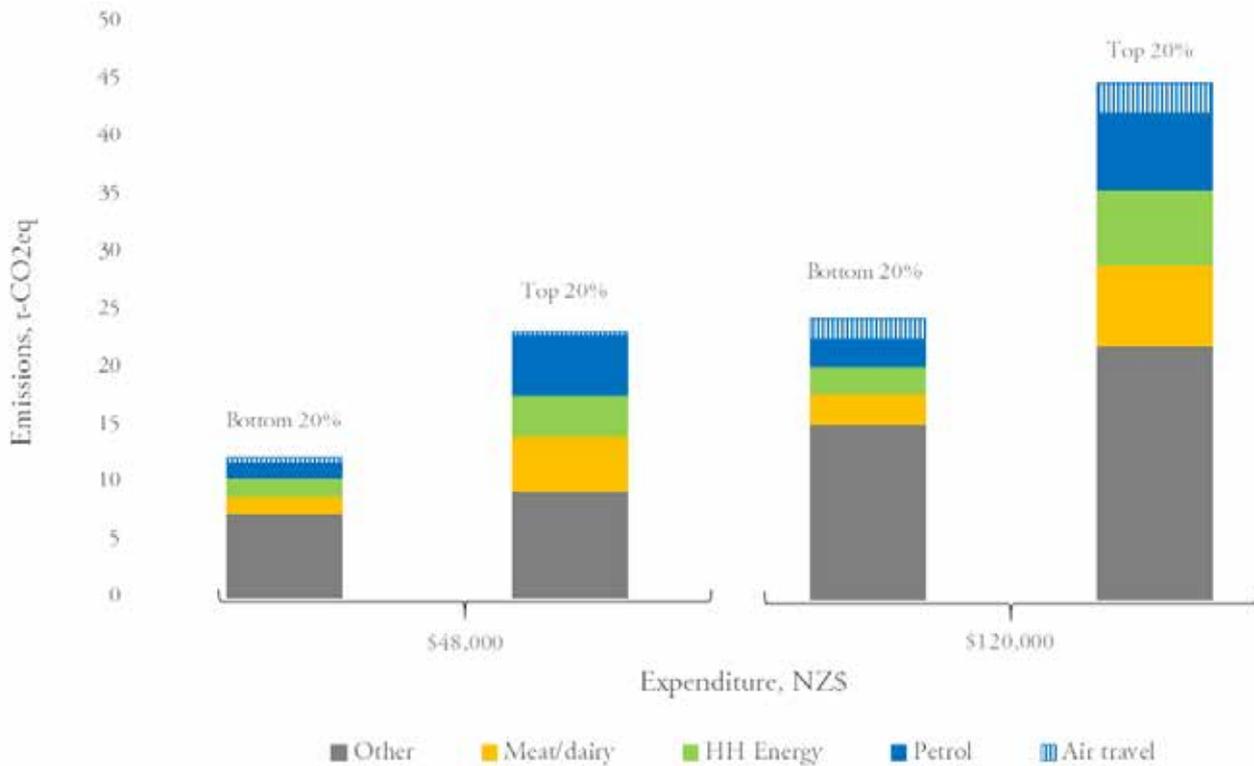
The relative importance of the different categories changes with a household's income. For poorer households, food and household utilities are the most important emissions sources. Household utilities are a smaller fraction of a household's

#### Disclaimer

emissions for wealthier households, for whom transport emissions are the most significant emissions category. This occurs because wealthier households are more able to use transport for leisure activities, such as going away for a long weekend. Wealthier households also do more international travel.

There is a lot of variation across otherwise similar households. Households have some control over their emissions and can influence them by choosing different goods and services. The graph below looks at the variation in household emissions for two person households with the same level of expenditure.

**Variation in household emissions**



The differences within income groups are mainly driven by differences in transport choices. The richer most emitting households fly internationally more often. Regardless of income, the households that emit the most drive more often.

There is also some difference in diet, with the higher emitting households eating more meat and dairy than the least emitting. The most emitting households at each level of income had nearly twice the emissions of the least emitting households.



## HOUSEHOLD EXPENDITURE AND EMISSIONS

On average, the main factors that determine a household's emissions<sup>1</sup> are its expenditure and the number of people in the household. A 10 per cent increase in household expenditure leads to a 7 per cent increase in emissions. As households get wealthier, they tend to spend more money on services, which are less emissions-intensive. This is why a 10 per cent increase in expenditure generates a less than 10 per cent increase in emissions.

Larger households also have higher emissions (even if their expenditure is the same), and young children are less emissions intensive than adults, at least until they grow up.

Emissions from household energy do not increase much with expenditure. This makes sense – richer people do not use a lot more electricity as there tends to be a baseload amount used in cooking, bathing, heating, and lighting for all households. Transport emissions, on the other hand, are very responsive to increases in expenditure. This is especially true for air travel. Our data only measures air travel for personal reasons, such as holidays, visiting relatives etc.

Given the relatively high cost of air travel, it is not surprising that wealthier people have higher emissions from air travel.

Our research found:

- Emissions tend to increase with age, all else equal. This may be due to older households having more disposable income from having paid off the mortgage, leaving more income available for more luxury items, such as travel.
- Emissions tend to be higher in the South Island, which we think is due to its cooler climate.
- Auckland is home to more migrants, who may have higher emissions from international air travel from travelling home more frequently to visit relatives.

## FALL IN AVERAGE HOUSEHOLD EMISSIONS

After controlling for household characteristics, an average household's emissions were 4.6 per cent lower in 2012 than in 2006. This represents a reduction of about 1 tonne of carbon dioxide equivalent (t-CO<sub>2</sub>eq) for a two person household with \$80,000 of expenditure.

This fall is in part due to the fall in emissions from household energy (down 10 percent between the two surveys). This result is consistent with the observed decline in total residential electricity consumption since 2006. Using an estimate of how much household electricity demand responds to changes in prices, roughly half of the decrease is consistent with a price response by households. The remainder is consistent with general improvements in energy efficiency. Interestingly, there was no such reduction for petrol and diesel emissions, despite a similar price increase between the surveys.

While household emissions have fallen on average, the size of the decline does depend on the type of household. The decrease was smaller for wealthier households.

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<sup>1</sup>Using a sample of over 5000 households from the 2006 and 2012 waves of Statistics New Zealand's Household Economic Survey.