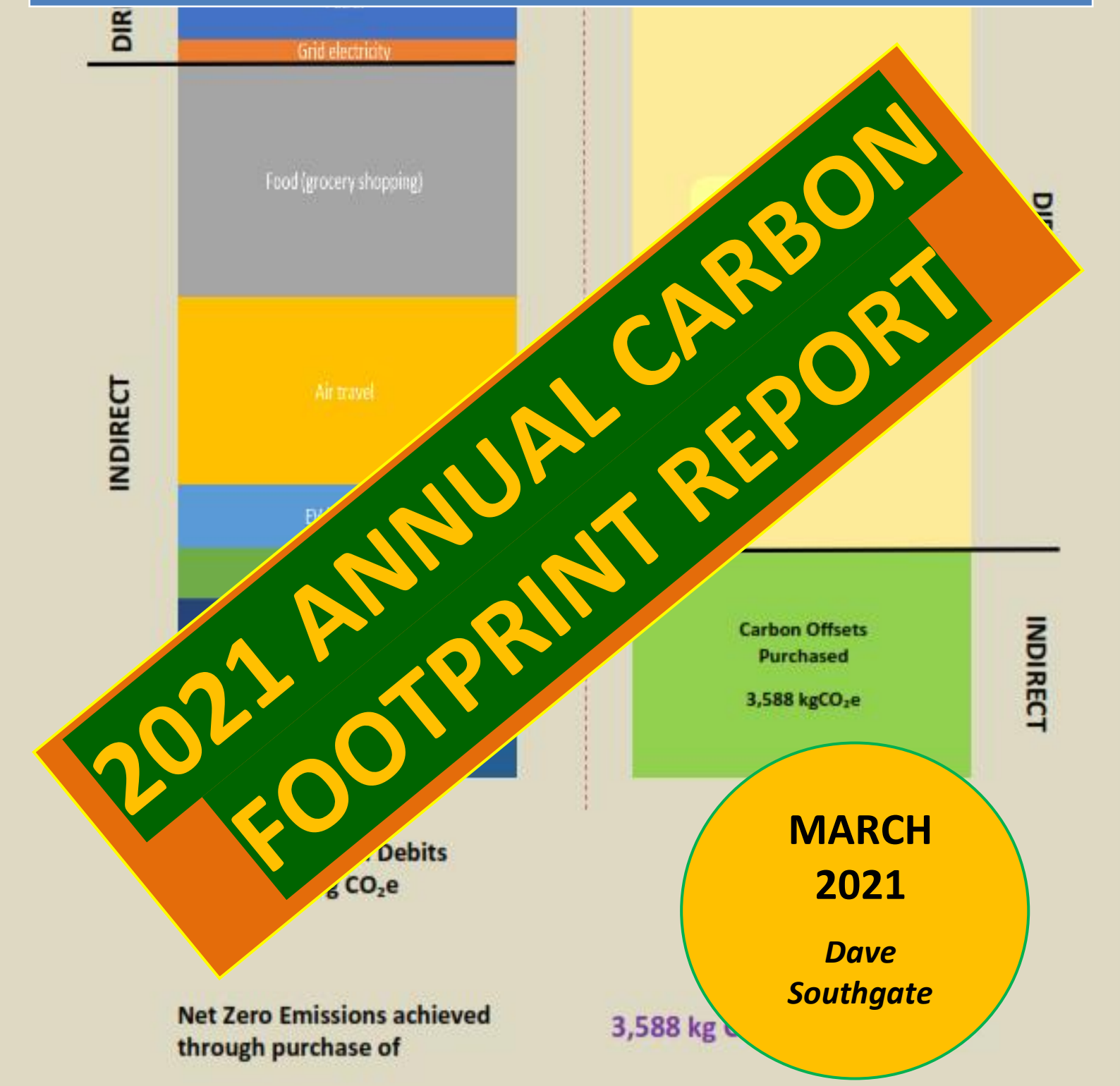
Our Household Energy Transition

Becoming a Net Zero Emissions Family



2021 ANNUAL CARBON FOOTPRINT REPORT

MARCH 2021

Dave Southgate

Foreword

This carbon footprint report updates last year's annual carbon footprint report for our household which I released in March 2021. I have re-worked the data to reflect the changes in our energy and other consumption that took place over 2021. However, as far as possible I have left the format of the report unaltered in order to facilitate easy comparison of our total household carbon footprint between the years.

Our energy transition project has now been proceeding at one level or another for about ten years. In recent years our patterns of energy use have largely stabilised and, while I have continued to produce project Annual Reports up to 2021, I have now decided that from next year I will adopt a more streamlined reporting approach. In future I intend to combine our Annual Reports with our Carbon Footprint Reports to focus on describing the steps we are taking to maintain our household net zero emissions status.

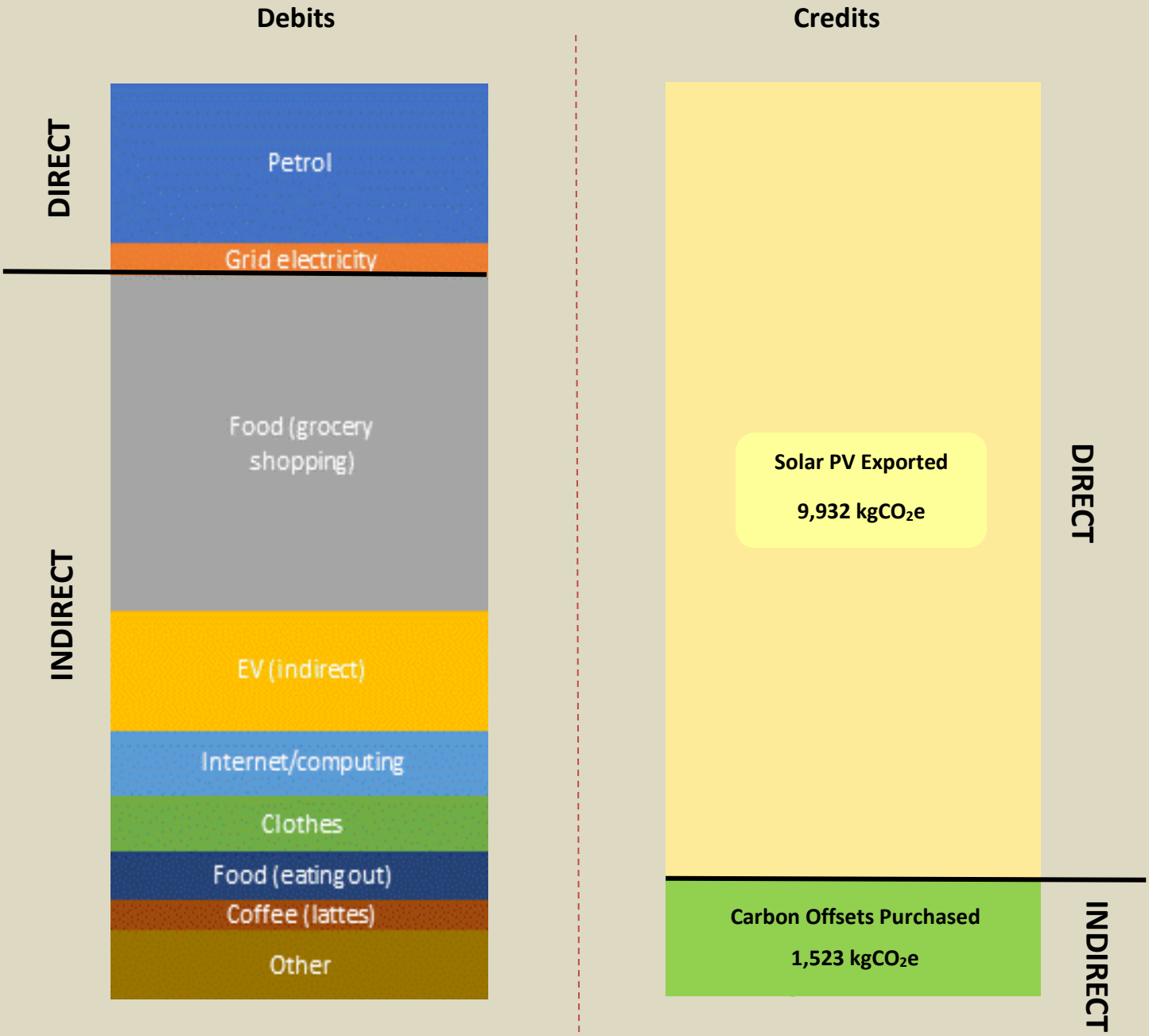
In 2021 I needed to buy significantly fewer carbon offsets than in 2020 to achieve a 'net zero emissions' outcome for our household. This is primarily because we did not fly in 2020 due to Covid constraints.

Dave Southgate

Canberra

March 2022

Household Carbon Balance Sheet 2021



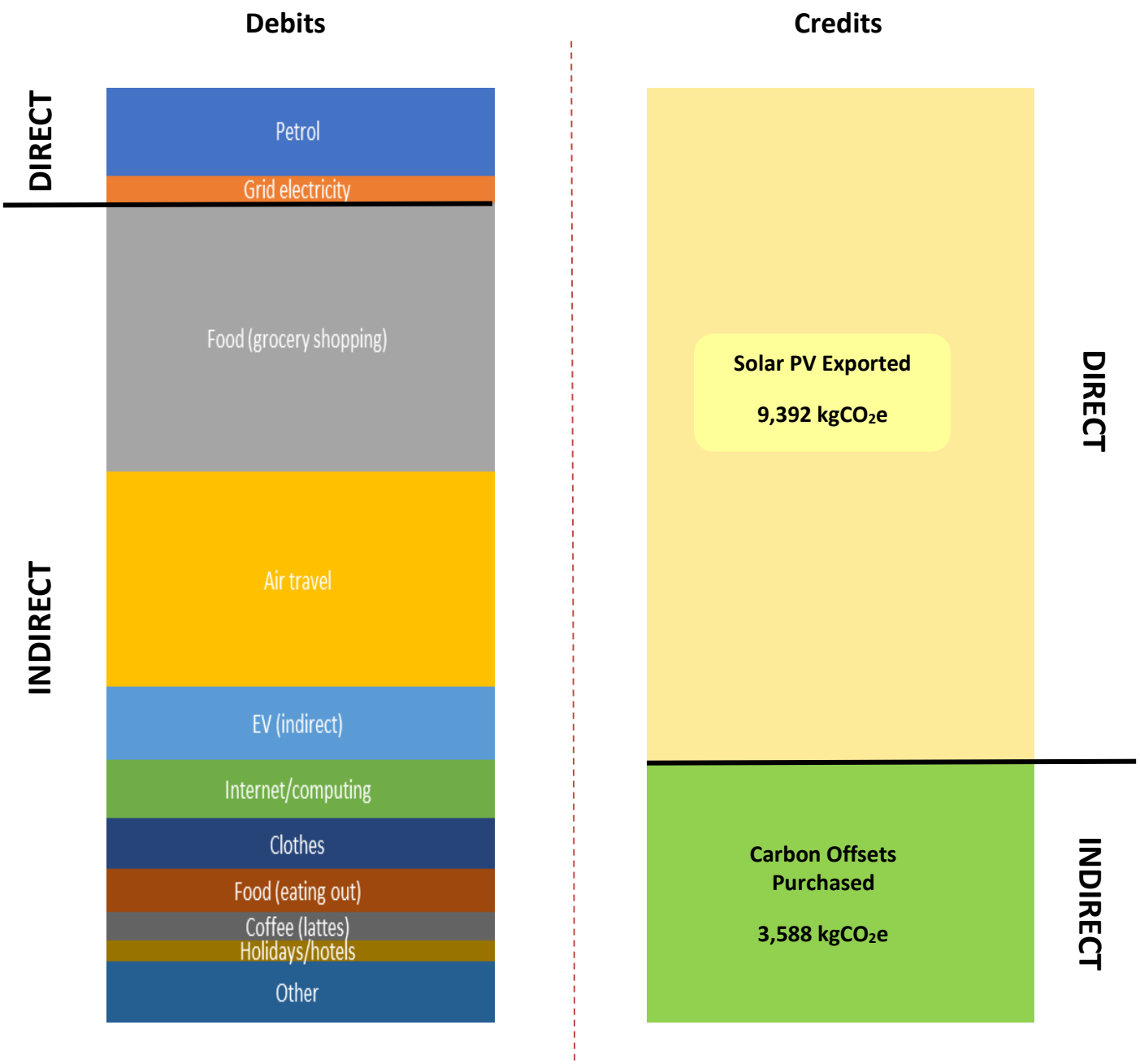
TOTAL Carbon Debits
= 11,455 kg CO_2e

TOTAL Carbon Credits
= 11,455 kgCO_2e

Net Zero Emissions achieved through purchase of

1,523 kgCO_2e carbon offsets

Household Carbon Balance Sheet 2020



TOTAL Carbon Debits
= 12,980 kg CO_2e

TOTAL Carbon Credits
= 12,980 kg CO_2e

Net Zero Emissions achieved through purchase of

3,588 kg CO_2e carbon offsets

Background

I produced my first Carbon Footprint Report for our household (covering 2019) in early 2020. The 2019 report contained some foundational detail that I have not repeated in my subsequent reports. The reader may therefore wish to refer to that document for a more detailed account of some of the background in this latest carbon footprint report.

In essence, this Carbon Footprint Report is part of a suite of documents I have released which describe our transition from being a 100% fossil fuelled household to one which I intend, eventually, will be totally powered by renewable energy. In recent years I have changed our aim from being 100% powered by renewables (ie having a zero direct carbon footprint) to having a net zero carbon footprint across all of our activities.

In this document I report the quantum of both our direct and indirect carbon footprints. I have been computing and reporting the value of our household's direct carbon footprint (ie the carbon footprint of the fuels we directly buy to run our household (namely grid electricity and petrol)) for a number of years. I consider the data used to compute our direct footprint as very solid. On the other hand, I have only been computing our indirect carbon footprint (ie the carbon embedded in the goods and services we use/buy) for two years and at this stage I consider the valuations I have arrived at as preliminary.

In this year's report I have attempted to keep the structure, formatting and footprint computation methodology as close as possible to that which I used in my first carbon footprint report. In some parts I have retained large sections of text from my earlier report. I have done this not only to make my job easier, but also to facilitate the transparent tracking of changes between years (within, what I hope, is a largely standalone document).

Overview

In the two previous pages I have shown an overview of our household carbon balance sheet for 2021 and for 2020. Our total household carbon footprint dropped from approximately 13 tonnes CO_2 in 2020 to around 11,500 tonnes CO_2 in 2021.

The main components in this change was an increase in our household petrol use (see our 2021 Annual Report for details) which was more than compensated for by a reduction in our air travel. I imagine that these two figures will ebb and flow between years as (hopefully) our overseas holiday options open up post Covid and our growing teenage children start to travel independently around town (in 'mum's car').

I have reported small increases in our footprint relating to: some changes in our food consumption patterns; and to reflect that early in the year we replaced our Nissan Leaf with a Tesla Model 3.

The credit side of our carbon ledger did not change as much as I had anticipated between 2020 and 2021. While we installed an extra 6kW of solar PV on our roof early in 2020 this did not result in as big a solar PV export in 2021 as expected due to poor solar PV conditions in the final months of 2021 due to the influence of *La Niña* weather patterns.

In order for us to reach carbon neutrality for 2021 I needed to purchase about 1.5 tonnes of carbon credits compared to around 3.5 tonnes in 2020.

I noted in my earlier reports that I was not particularly happy with the quality of the third party carbon credits I had been purchasing but I had not been able to find a more suitable provider. I was

therefore particularly pleased this year to have found a carbon credits provider which sells offsets which much more closely match what I am looking for. I discuss this in detail in Chapter3.

In the middle of 2021 I had my attention drawn to a potential large hole in my indirect carbon footprint computations. In my computations I had not (and have also not in this report) taken into account the carbon footprint of my savings/investments. This is a complex area, but prima facie I think it is likely to be a significant issue. I have not yet decided how, or maybe if, I'll deal with this. I discuss this in detail in Chapter 3.

Direct Carbon Footprint

Chapter 1 Direct Debits & Credits

Debits

As discussed in the Background, we have been working for a number of years to reduce our direct use of fossil fuel based energy as part of our project to become a Fossil Fuel Free Family.

Figure 1 gives a breakdown of our direct energy use over 2021. This Figure is extracted from my Annual Report for 2021 and the reader is invited to look at that document if you want more detailed information.

It can be seen that in 2021 we sourced about 45% of our household energy use from our solar PV systems.

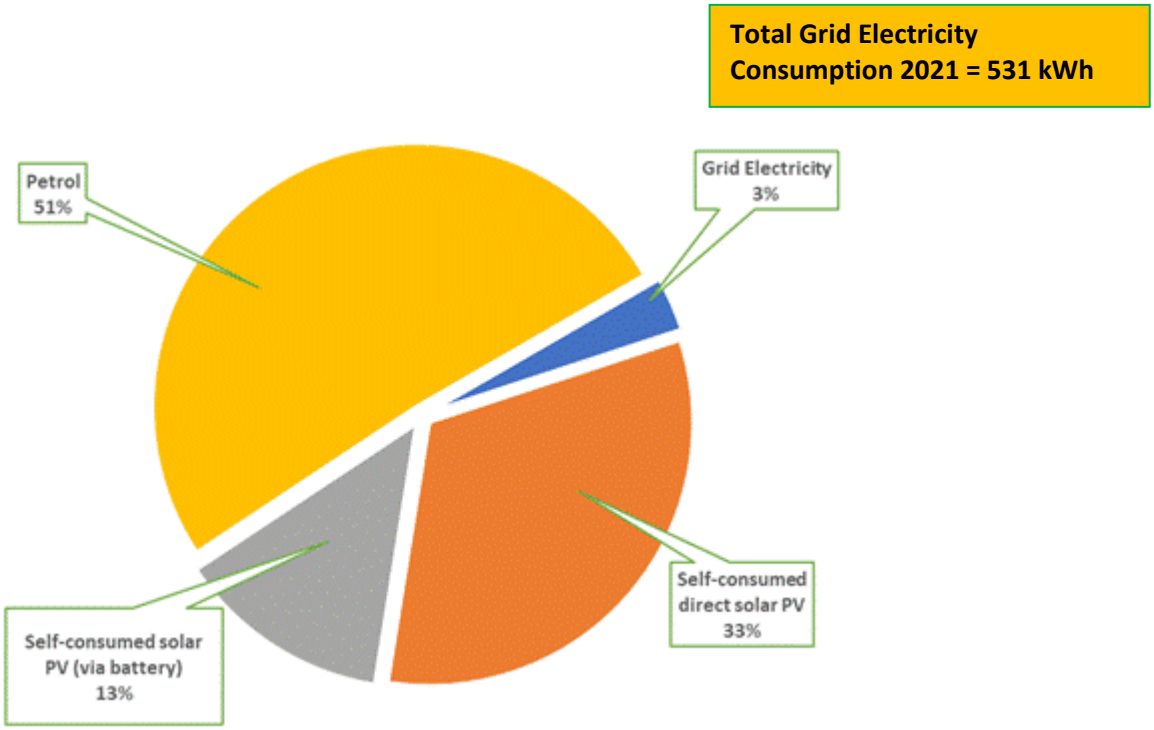


Figure 1: Breakdown of our household energy use 2021

I have converted our fuel consumption data into kg CO_2e using the Government's published greenhouse accounts factors for 2021. The values for our petrol and grid electricity carbon footprints are shown in **Figure 2** in the next Section.

Credits

In my 2021 Annual Report I also discuss our solar PV production and export for the year. We exported 12,572 kWh of solar PV electricity in 2021. I have converted this to a carbon credit of **9,932 kgCO_2e** using the published greenhouse accounts factors. I assume that each kWh of solar PV (carbon zero) electricity that we exported displaced one kWh of grid (mainly coal based) electricity.

Indirect Carbon Footprint

Chapter 2

Introduction

Computing one's **direct carbon footprint** is very straightforward. The energy user knows very accurately, from their energy bills, how much fuel they have used over a period of time. The amount of fuel used can easily be converted into carbon emissions through the application of published greenhouse accounts factors.

By way of contrast, computing one's **indirect carbon footprint** is not straightforward. It generally involves delving into many layers of data and making many assumptions. For example, if I buy a widget I can normally find out which country it is 'made' in. However, the product may contain many components which have been sourced from all over the world. Indeed, different batches of the same product may have components from quite different origins or be made from different materials. All these unknowns impact on the magnitude of a product's carbon footprint. Unless one is carrying out a detailed examination of a particular product one has to accept that the outcome of indirect carbon footprinting computations is only ever likely to be a gross estimate.

This document is not intended to be a scientific treatise. I have therefore tried to keep the language and concepts simple by avoiding many of the niceties that the specialist carbon accountant would use. I have done this not only to appeal to a wider audience but also because I see little value in getting bogged down in detail when I am only seeking to obtain high level estimates of my family's indirect carbon footprint.

Computing our Indirect Footprint

In this, the third of my carbon footprint reports, I have decided not to change any of the values of the carbon intensity of individual actions (ie the CO_2 emissions per unit of consumption) that I used in both the first and second reports. When I began computing our household indirect carbon footprint I spent some time researching values for how much CO_2 is emitted for each of the actions we undertake in our day-to-day living (eg eating different types of food, using the internet, etc) and it was very apparent that the values I arrived at could only be considered 'guesstimates'; as indicated above, there are just so many variables and unknowns that I don't believe I would arrive at any more reliable CO_2 output figures/unit of activity if I repeated the exercise.

Maybe in a few years' time, carbon footprinting will have matured, and low carbon agriculture, manufacturing and transport will have emerged to such an extent that there will be material reductions in unit carbon footprints.

Given the above, I worked through the list of CO_2 generating activities that I reported in **Figure 2** of last year's report and updated the values for the levels of consumption where I believe they varied from last year. **Figure 2** which follows captures my new estimates. I would judge that only one change in our indirect footprint was significant (we did not take any flights in 2021); other changes were essentially minor adjustments.

In my first carbon footprint report I discussed some obvious omissions in the list of activities/products shown in **Figure 2.** I have not tried to resolve any of those missing gaps because, as far as I can tell, they were not of great significance as far as the magnitude of our family indirect carbon footprint is concerned. However, a potential very significant gap became apparent last year – the indirect footprint of my savings/investments. I discuss this in Chapter 3.

CO_2 Emissions Type	CO_2e Source	Amount	Wt CO_2e (kg)	Comments
DIRECT	Petrol	8,223 kWh	2,000	
	Grid Electricity	530 kWh	420	
	TOTAL Direct		**2,420**	
INDIRECT	Food (grocery shopping)		4,110	See Appendix 1
	New EV (Tesla) (mfr)	1	1,500	15tCO_2e. Count over 10 years
	Clothes	100 items	700	7 kgCO_2e/garment
	Food (eating out)		600	5 lunches + 1 family meal/week
	Coffee	760 cups	380	0.5 kgCO_2e/cup
	Internet	4 persons	320	80 kgCO_2e/person
	Desk top computing	4 computers	300	60 kgCO_2e/y + printer
	Holidays/hotels	1	100	30kgCO_2e/night for hotels
	Mobile phone	4	200	50kg/yr
	Public Transport	5,000 km	200	
	Electricity (indirect for both grid + solar PV)		180	35 kgCO_2e for grid + 145 kgCO_2e for solar PV
	Shoes	10 pairs	150	
	Library books	250	125	5 kgCO_2e/book; book read 10 times
	Petrol (indirect)		65	Scope 3 emission factors
	Toilet paper	$4x10^4$ sheets	60	1.5 g CO_2e / sheet
	Washing clothes	200 washes	45	220 gCO_2e/wash for washing machine
	TOTAL Indirect		**9,035**	
TOTAL CARBON FOOTPRINT			**11,455**	

Figure 2: Breakdown of my family's direct and indirect carbon footprints for 2021

Discussion

I have translated the indirect carbon data in **Figure 2** into the visualisation in **Figure 3.** Food immediately jumps out as the overwhelming contributor to our household indirect carbon footprint. It makes up about 45% of this footprint. Given the importance of this component I have given a detailed breakdown of food's contribution to our family footprint in Appendix 1.

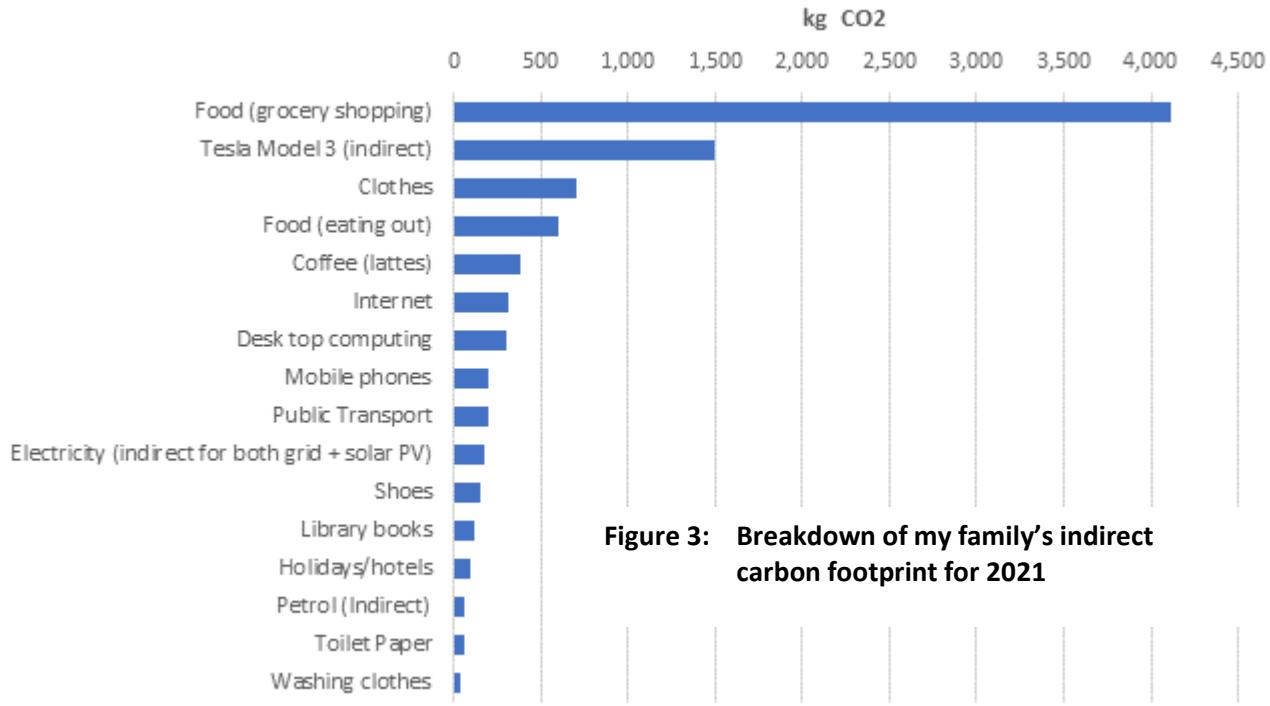


Figure 3: Breakdown of my family's indirect carbon footprint for 2021

If the food carbon footprint is broken down into broad food groups an interesting picture emerges (**Figure 4**).

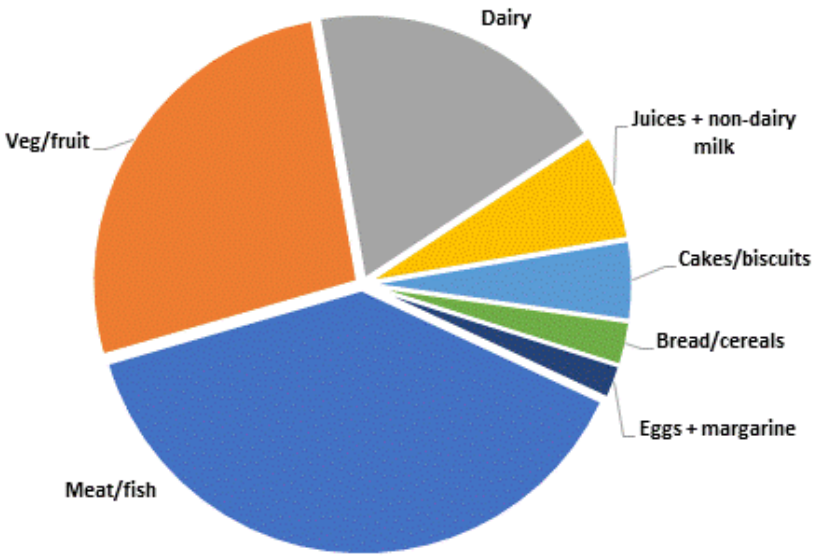


Figure 4: Broad breakdown of my family's food carbon footprint for 2021

About 80% of our food carbon footprint falls into only three groups: meat/fish; veg/fruit; and dairy. I'm not sure what a dietician would say about this. Anyway, it is easy to see why a vegan diet is being promoted as a good way to reduce your carbon footprint!

It is also interesting to breakdown our total (direct + indirect) footprint into broad categories. This picture is shown in **Figure 5**.

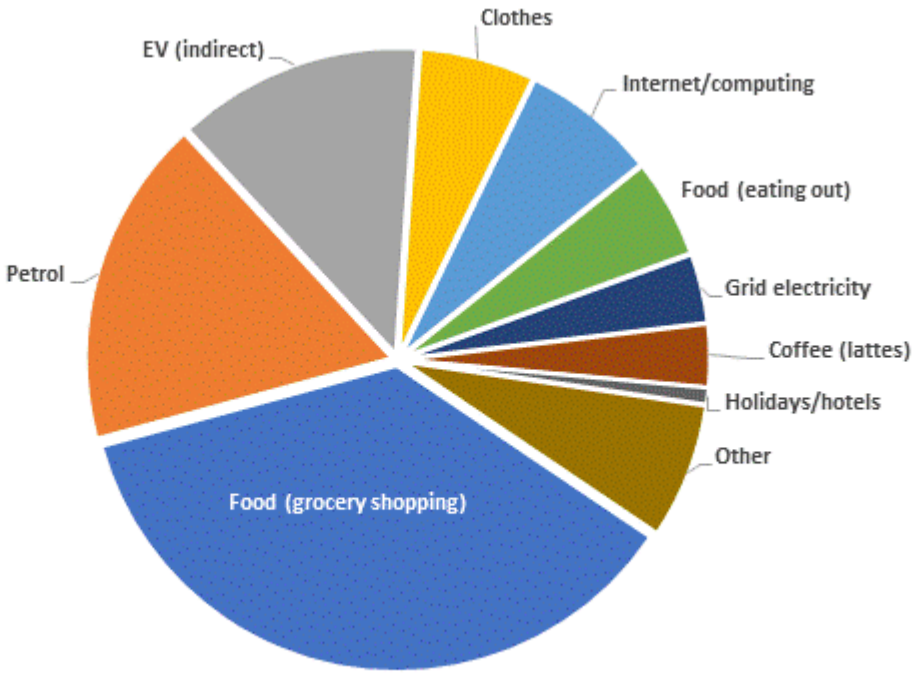


Figure 5: Our total 2021 carbon footprint shown in broad categories

It can be seen that 'EV (indirect)' is a significant contributor to our total carbon footprint. This category primarily relates to the carbon footprint of the manufacture of our EVs (we started 2021 owning a Nissan Leaf and replaced this with a Tesla Model 3 in March). In my earlier reports I assigned 1 tonne of CO_2e/year to our Nissan Leaf. In this 2021 report I have assigned a figure of 1.5 tonnes of CO_2e/year to reflect the larger size of the Tesla. This is intended to cover the footprint over a ten year life of the vehicle.

As noted in my earlier reports, it is interesting to note that apart from 'clothes' and 'EV (indirect)' all the categories in the Figure involve products that are, to all intents and purposes, immediate consumables. Sadly, these days even 'clothes' are often little more than short term consumables.

What Carbon Footprint do I Choose?

I have included this little section unedited from last year as I believe it is an important issue. Only recently I read an article in the media which seemed to me to involve some gross double counting.

After I released last year's report I entered into an extremely useful debate about the way I allocate a CO_2 value to a product. When computing the carbon footprint of a product or service, should I use the value of the actual amount of CO_2 emitted in providing that product/service, or should I use the derived value if the carbon in the product/service has already been offset by the provider?

For example, the ACT Government has entered into PPAs (power purchase agreements) with renewable energy providers to the extent that all the electricity consumed in the ACT can now be considered to be net carbon neutral. Therefore, can I now ignore any CO_2 emissions associated with consuming grid electricity in the ACT or should I compute our indirect carbon footprint using the actual CO_2 emissions made when our electricity is generated (the actual electricity consumed in the ACT is primarily delivered by the NSW grid which is heavily coal based)? [Data for the actual carbon intensity of ACT electricity is published in the Federal Government's Annual Greenhouse Factors reports.]

After giving this some thought, I am most comfortable with aiming to use the actual emissions, and not derived emissions, when carrying out my carbon footprinting. It seems to me that using derived emissions can lead to double counting and all sorts of complications. For example, the ACT claims its electricity is carbon neutral while at the same time South Australia, where much of the ACT's carbon free electricity is generated, is also claiming that its electricity is carbon neutral (apparently based on renewable electricity where much of the carbon has been allocated to third parties through PPAs). I don't think this is necessarily a problem, but I think everyone needs to be extremely careful about their carbon claims.

I believe my approach is more robust and conservative. In essence our indirect carbon footprint will only approach zero when the grid, and all other parts of the economy, are actually decarbonised.

Chapter 3

Managing Our Carbon Footprint

As indicated earlier, the key aim of our energy transition project is now to have net zero emissions computed on an annual basis. In simple terms I will compute our direct and indirect carbon footprints at the end of each year to work out our annual 'carbon debt'. At the same time, I will compute the carbon footprint of our total solar PV export to give us our annual 'carbon credit' [see discussion below]. If our credit exceeds our debt, I will take no action. If our debt exceeds our credit, I will buy some form of external carbon credits to provide us with a balanced annual carbon budget.

Direct Footprint

As discussed earlier, I have regularly reported on our efforts over the past eight years to reduce our household direct carbon footprint. At the current time we are about 95% fossil fuel free as far as energy use within our house is concerned. I believe that this is about the practical limit and I am no longer focussing on this as a key area for action.

By way of contrast, we are not going so well on reducing our use of petrol. Our consumption of petrol increased quite significantly in 2021, primarily due to our son getting to the age where he has also become an independent car user (ie borrowing 'mum's (petrol) car'). I have yet to persuade my wife to give up her petrol car – we will have to take this step if we want to seriously reduce the direct carbon footprint of our household transport.

Indirect Footprint

Throughout 2021, like in previous years, I kept a look out for ways in which we could reduce our household carbon footprint. I have reported on our efforts in my transition Annual Report for 2021. Unfortunately, while I discovered some really interesting 'forward steps', notably hand warmers and a very acceptable meat substitute, I don't think these materially reduced our footprint.

I've noted earlier that our footprint was lower in 2021 primarily because we did not fly. I'm not sure when we will next fly, but borders are now opening up around the world post-Covid and inevitably we will be flying again before too long (both my wife and I have family overseas). We will manage this footprint through the purchase of carbon offsets of some form.

Clearly it is not going to be easy for us to reduce our indirect carbon footprint on a sustained basis. I guess that ultimately we will be relying on all product manufacturers, service providers, transport providers, etc de-carbonising their offerings. When shopping, if I can identify a low carbon product I am very inclined to buy that product even if competing, higher carbon, options are cheaper.

Carbon Credits

To repeat what I said in last year's report, this is a grey area. When you move into the world of 'net' carbon footprinting you are, by definition, moving into an area where there is some form of trading between positive and negative footprints. To achieve 'net zero emissions' some form of carbon credit will usually be used to balance a carbon debit. This can be done in a number of ways, but it is often a contested space which leaves many people feeling that any carbon reductions are 'notional' rather than 'actual'.

I see that there are two broad routes that are open to us to offset our carbon emissions. We can generate our own offsets by putting carbon free electricity back into the grid or we can buy offsets from a third party.

Generating our own credits

I am most comfortable with using credits which I can physically generate and monitor myself. Therefore, I have placed a fair bit of emphasis on maxing out the solar PV on our roof and then exporting as much of our 'carbon free' electricity as possible (while minimising our use of grid electricity).

You can see in **Chapter 1** that we created a credit of about 10t CO_2e in 2021 from the export of solar PV electricity from our house.

An intermediate option

Before discussing the purchase of third-party carbon offsets, I think it is important to point out an intermediate option between direct self-generation and buying third party offsets: direct investment in a solar PV farm or other facility generating zero emissions electricity (eg a wind farm).

At the time of writing in early 2022 I have just bought into a community solar farm based in Goulburn. At this stage I have no idea how much of the solar farm's output I will be able to ascribe to my investment, but in future year's I intend to count this output as a carbon credit when computing our annual household footprint.

I am very comfortable with this sort of offset as I will be sure that my money will have directly contributed to a reduction in the output of coal-based electricity.

Buying third-party offsets

I noted in my previous carbon footprint reports that I was not particularly happy with the offset provider I was using. Without going into great detail, I wanted more choice and detail about the projects my money was being invested in; and I was concerned that the price I was paying for the carbon was much too low. The fact that the provider only reported the amount of carbon I was buying in lbs, rather than kg, left me with lingering doubts about the authenticity of the offsets.

In the middle of 2021 I came across an offset provider which is much more to my liking. My new provider appears to be much more convincing: it offers a wide range of offsets both in type and geographical location; in particular, it provides a range of renewable energy offsets which are my preferred type of offset; and the projects have a reasonable description (nevertheless I would prefer more technical details). In my view this new provider's website is very professional and gives confidence that 'real' offsets are being bought. I intend to use this provider in the future when I need to buy more offsets.

While I only needed to offset around 1.5 t of CO_2e, I purchased 2t of offsets to allow for a margin of error (the offset certificates are included in **Appendix 3**).

The Missing Hole – Investments

In mid 2021 I became aware for the first time, of the likely magnitude of the carbon footprint of savings/investments. My attention was drawn to a page on the Platinum Asset Management website which includes a table which shows the carbon footprint of investments in the different funds managed by that company. I assume that many investment fund managers are producing similar tables.

It is interesting the see the wide range in the magnitude of the footprints for the different funds. It is not hard to see that even relatively modest amounts of savings/investments could generate a footprint that significantly exceeds the computed total carbon footprint of our household which I have reported earlier.

I am a retired Commonwealth Public Servant – what is the carbon footprint of my Government superannuation? I don't think I can compute this, but if I could what should my reaction be?

Investment/superannuation managers place the funds of millions of us in Australian and international companies. Even if I own, through my super, one millionth of the shares of a large international company I am presumably responsible for managing a part of that company's carbon footprint. Maybe the company, like many companies, is actively taking steps to be carbon neutral through, for example, buying PPAs. Is that taken into account in the data produced for the fund managers? Lots of questions.

At the present my reaction is to simply note and be aware of this issue. I will try and track any developments and sound out other people about how to handle this in the future.

Appendices

Appendix 1 Food

I have updated the information in this Appendix to reflect the changing food consumption of a growing family. Given the uncertainties noted below, I have not attempted to update the values for the carbon intensity of the different food types.

It can be seen from the information I have provided in **Chapter 2** that for my family food is the largest contributor to our indirect carbon footprint. I imagine this is the same for most families. In fact for us, after years of working on our direct carbon footprint, food is also the prime component of our total carbon footprint. Given this, I had little choice but do a more detailed assessment of the footprint contributions of all the different things in our grocery shopping basket. I have shown the outcomes of this work in **Figure A1**.

As with my analysis in **Chapter 2**, I relied on searching the internet to find CO_2 emission factors for each of the food types I needed to cover. It is important to note that there are very diverse values in the literature for the carbon footprint of any given food type. When selecting my references I tried to use a consistent approach: ideally Australia based; preferably academic research; and give preference to the most recent work. In many cases in the end I just picked a value for the carbon footprint which was somewhere in middle of the range of published values. Therefore, I believe all of the CO_2 values I have computed need to be treated with some caution.

Description	Weight (kg/wk)	Carbon Intensity (kg CO_2e/kg)	Total CO_2 e (kg/year)
Meat: beef; lamb; chicken			
Beef	1	23	1,000
Lamb/pork/other	0.5	12	300
Chicken	0.5	3.7	200
Fish	0.5	3.4	85
Vegies	3	1	150
Fruit	5	1	250
Dairy: yoghurt; milk; cheese			
Milk	3	1.3	195
Cheese	0.5	20	500
Yoghurt	1	1.3	65

Description	Weight (kg/wk)	Carbon Intensity (kg CO_2e/kg)	Total CO_2e (kg/year)
Non-dairy: milk; margarine			
Oat milk, etc	6	0.6	180
Margarine	0.5	1	25
Juices	3	0.6	90
Breakfast cereals	1	1.2	60
Cakes; biscuits; chocolate	1	1.5	75
Eggs	12 eggs	1.5	60
Bread	1	1	50
Spreads	0.5	2.9	75
Frozen: veg; ice cream			
Veg	1	2	100
Ice cream	0.5	2	50
Tinned/bottled: beans; fruit; etc	6	2	600
TOTAL			**4,110**

Figure A1: Itemised family food carbon footprint for 2021

In order to get a better visualisation of the importance of the individual food types shown in the Table, I have produced the bar graph shown in **Figure A2.**

The information in the Figure has been categorised into groups to provide the picture shown in **Figure 4**.

When computing our food carbon footprint, I only tried to capture the foods which make up our normal weekly shop. There are of course many other items which we use often in the kitchen but only need to buy from time to time – eg herbs, spices, sauces, etc.

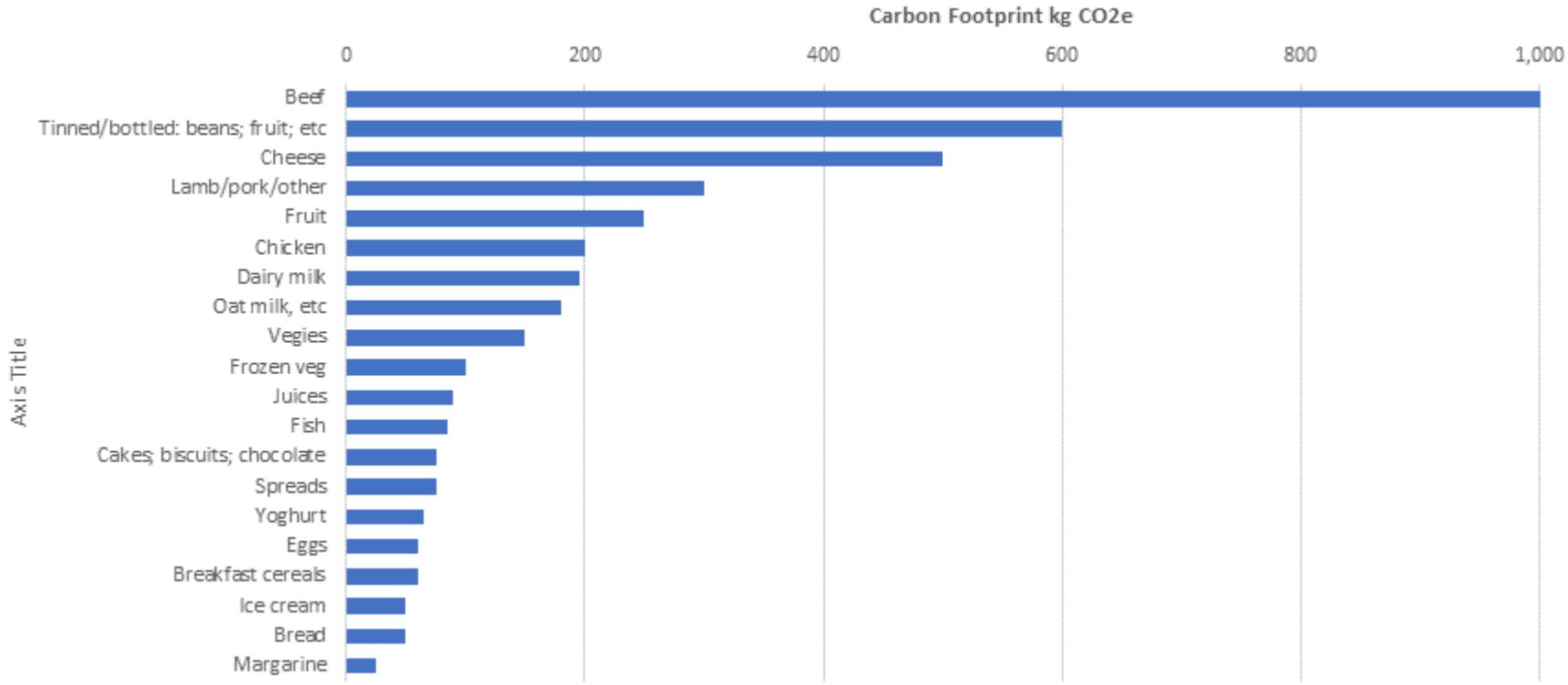


Figure A2: Visualisation of our itemised family food carbon footprint for 2021

Appendix 2 References

In a similar vein to **Appendix 1**, for completeness and to assist transparency, I have included an unedited version of this listing of the references I used for deciding upon the carbon intensities I use throughout this, and previous, reports.

When trying to ascertain the carbon emission factors I simply Googled for the activity/product groups listed in **Figure 2** and the food types listed in **Figure A1**. I did not do this in a particularly rigorous way: I always selected at least three separate sites to ascertain the range of the claimed emission factors; if the first few sites gave a similar answer I did not go further and I picked what I thought was a good round number for the average value; if there was no apparent agreement I opted for the figure that was shown on what I judged to be the most credible site. This process was crude and involved lots of judgement – the figures in the Tables should therefore be considered to be purely indicative.

When I was going through this process I noted down values and/or captured the links of particular sites which I've listed below essentially unedited. These may, or may not, have been the sites which I used to obtain the final emissions factor values which appear in the Tables.

While my Googling appears to be haphazard, I deliberately did not want to get too bogged down in detailed examination of very diverse papers - I think it is self-evident that very carefully working through masses of poor and inaccurate data is not likely to improve the reliability of your results. Against that background, I reiterate that the computations for our indirect carbon footprint should only be treated as indicative.

My informal notes/web site links are listed below, this only represents a small sample of the sites that I looked at:

Beef 50-60 kgCO2e/kg (at best): https://www.theland.com.au/story/6527876/beef-must-stop-ignoring-its-large-co2-footprint/

Beef 75 kgCO2e/kg beef (derived from figure in article): http://www.fao.org/news/story/en/item/197623/icode/

Beef massive variation in published figures most common figure about 25 kgCO2e/kg (most of these studies not Australian). CSIRO similar figure: https://www.publish.csiro.au/an/an11030

Fruit and vegies (US): http://www.circularecology.com/news/wonky-fruit-and-veg-the-carbon-footprint-of-food#.XlYJMWgzZhE

Food Australia (RMIT): https://www.rmit.edu.au/news/all-news/2016/november/new-study-provides-carbon-footprint-league-table-for-food

Australian cheese: https://milkmaidmarian.com/2018/06/07/the-aussie-dairy-carbon-hoofprint/

Milk – major differences in different publications (could be global differences)

Margarine: https://www.bettermeetsreality.com/the-impact-footprint-of-producing-eating-butter-margarine/

Coffee: https://www.ecowatch.com/coffees-invisible-carbon-footprint-1882175408.html

Food miles debate: https://www.theguardian.com/environment/2008/mar/23/food.ethicalliving

Eggs: https://www.australianeggs.org.au/dmsdocument/521-environmental-assessment-of-an-egg-production-supply-chain-using-life-cycle-assessment

Bread: https://blog.csiro.au/how-green-is-your-bread/

Cakes etc detailed study: https://www.sciencedirect.com/science/article/pii/S2352550918303087

Sandwich: https://www.theguardian.com/lifeandstyle/2018/jan/25/scientists-calculate-carbon-emissions-of-your-sandwich

Juices: https://stanfordmag.org/contents/getting-the-most-sustainable-squeeze-from-your-oj-essential-answer

Peanut butter: https://www.farmprogress.com/peanut/peanut-s-environmental-footprint-stretches-beyond-farm

Frozen veggies: https://stud.epsilon.slu.se/6377/7/gottfridsson_l_140304.pdf

Ice cream: https://www.benjerry.com/values/issues-we-care-about/climate-justice/life-cycle-analysis

Nissan Leaf indirect: https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change

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Appendix 3

Carbon Offset Certificate

Certificate Number: 16449728031515

DAVE SOUTHGATE

has compensated

2.00

tonne(s) of CO_2 emissions

By making a contribution to verified emission reduction projects, you demonstrate your commitment to climate action and UN Sustainable Development Goals.

Renat Heuberger CEO, South Pole

south pole

Issued by: South Pole Carbon Asset Management Ltd.
Date: 16/02/2022

About the Author

Dave Southgate retired from the Australian Government Public Service in July 2012 after a 31-year career as an 'environmental bureaucrat'. After working for 8 years in government environmental agencies at both the State and Federal levels he joined the Australian Government Transport Department in late 1989 and stayed there until he retired. Throughout his time in Transport he specialised in aircraft noise; in the latter years he also became involved in aviation climate change issues and developed a particular interest in carbon footprinting.

From 2004 to 2012 Dave was the Australian Government representative on the United Nations International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). He pursued his interest in carbon footprinting while on CAEP and was a member of the group that oversaw the development of the ICAO Carbon Calculator.

Not long after his retirement Dave began a process aimed at transforming the energy use patterns in his 100% fossil fuelled household. This project initially aimed at his family becoming 'Fossil Fuel Free' (in essence the goal was for his household to no longer directly buy any fossil based fuels, namely grid electricity, gas or petrol). In later years Dave has expanded this project to include his family's indirect carbon footprint in order to become a net zero emissions family (hence this report). Dave has written numerous reports and articles about this project. These can be viewed and/or downloaded from his website.

Dave has a science/engineering background and has degrees from the Universities of Liverpool, London (Imperial College) and Tasmania.

You can find consolidated information on our household energy transition project at my website: https://netzeroemissions.net/