BESTFOOTFORWARD
The Sustainability Consultants

Best Foot Forward

FoodPrint Calculator

Assumptions and data sources

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1 Introduction

1.1 Project background

The 'How to Feed a City' project aims to provide communities and local institutions with the tools to understand and influence the long-term sustainability of their food supply.

To assist in this, one of the main outputs of the project is a web-based food sustainability calculator – the underlying assumptions for which are detailed in this document.

The tool is aimed at our main user groups: informed local decision makers. These include: people in local government, procurement professionals at health authorities, universities, shops, and people setting up groups looking to replicate the Growing Communities[1] model.

It draws on the growing body of information on food sustainability, and act as an accessible decision support tool, enabling users to start to make sense of the many trade-offs and competing issues.

We believe this is the first time such a tool has been attempted – and believe it meets a growing demand within industry, government and other interested parties to explore challenges around food environmental impact and healthier diets[2].

1.2 Tool characteristics

The tool addresses the four main factors that we think should be considered when developing a food procurement strategy: diet (consumption), food production, location of production, and food/packaging waste. Users input values about these characteristics for each of the following food groups[3]:

- Dairy products
- Fish
- Fruit and vegetables
- Grain, starches & derived products
- Red meat & meat products
- White meat & white meat products
- Eggs
- Vegetable and animal oils and fats
- Other food products (incl. sugar)
- Alcoholic beverages

Based on user inputs the tool describes environmental impact and 'food system characteristics'. The latter explores three issues: reliance on global trade, nutrition and an estimate of the availability of land to meet the chosen diet.

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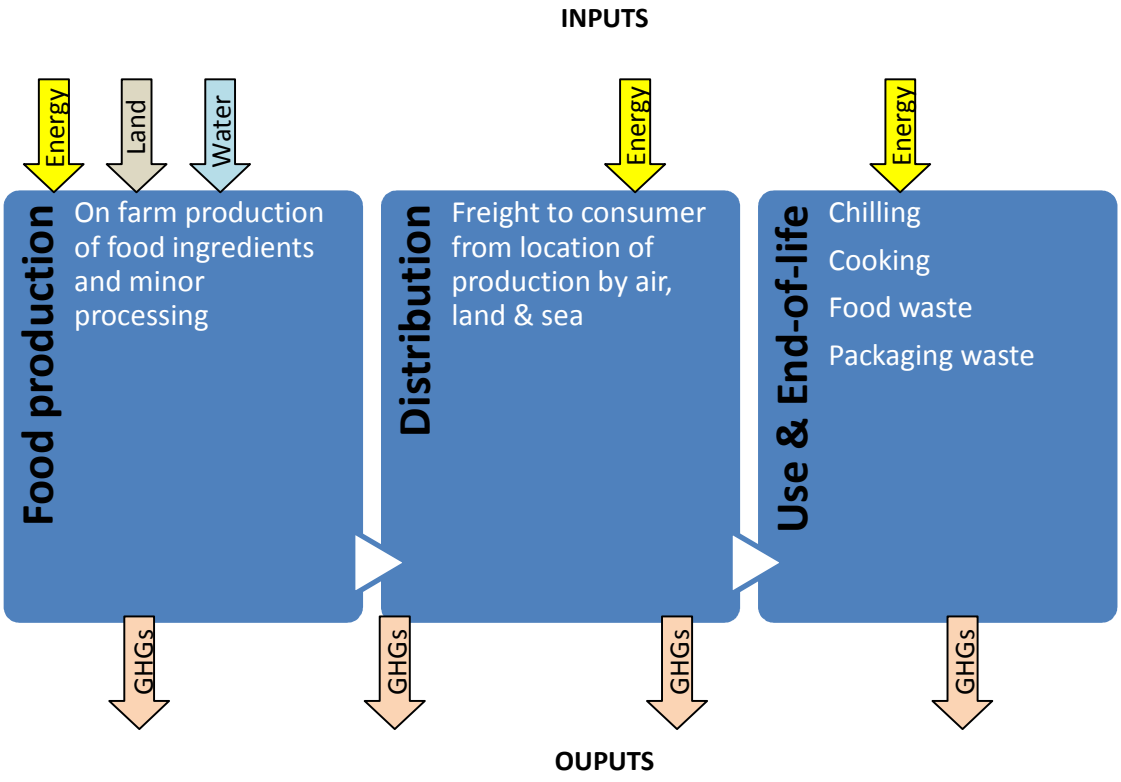
[1] http://www.growingcommunities.org/

[2] E.g. Defra project FFG 1004 'Assessing the environmental impacts of 'healthier' diets'

[3] The objectives of the tool – and data availability constraints – called for the foods to be grouped into a relatively small number of categories which can be easily interpreted by users. It was intended that foods within each group should have broadly similar production characteristics and align with existing food categories (e.g. FAOSTAT, Defra Food Survey, Food Standards Agency's Eat Well Plate).

The tool quantifies the energy, water, land[4] and climate change impacts of different food procurement scenarios (see Figure 1). The tool approaches environmental impact from a life cycle perspective: examining the supply chain from agricultural production to waste disposal. These indicators were chosen following a review of possible environmental impacts to model[5].

Figure 1: Summary of environmental impacts, life cycle stages and processes to be modelled

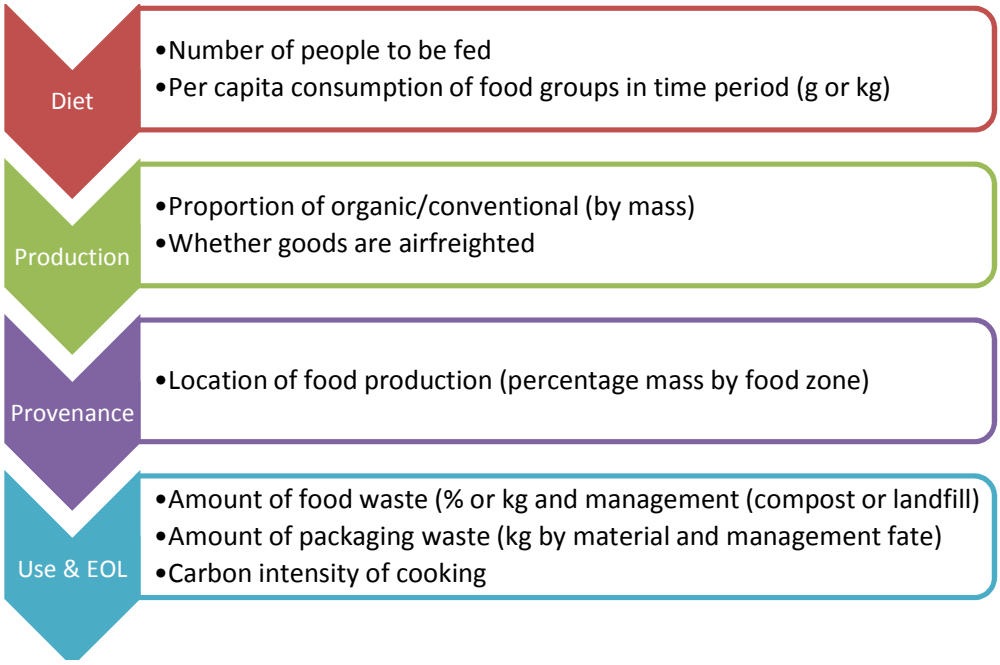


The tool does not attempt to address all aspects of food system sustainability – e.g. ecosystem function, trade partnerships, animal welfare, etc.

The tool is intended to help with the initial strategic steps towards setting up a food strategy and is not a detailed predictive model. Instead it encourages experimentation and demonstrates interactions and trade-offs in the system. Adjustments to the tool show the impacts on outputs in real-time. The outputs can then be used, with other materials, to help build up a picture of the relative risks and benefits of different decisions in the food system, and to help people to prioritise a strategy for action and more detailed research, environmental assessment and target-setting.

[4] Only agricultural land is included – i.e. does not include built land, etc.
[5] See How to Feed a City report 'A review of UK food chain resilience and environment impact'

Figure 2: Summary of user input requirements



2 Life cycle impact of food consumption

2.1 Food production

2.1.1 Production conversion factors

At the heart of the model are conversion factors for the agricultural production of the 10 different food types (see Table 1). These were obtained from a variety of sources (detailed below) and focus on cradle-to-farm gate emissions (where the majority of environmental impact lies in foods). For some foods (e.g. dairy, alcoholic beverages, grain products) processing has also been included. Food processing is explored in more detail in Section 2.1.3

Table 1: Food production conversion factors for energy, land, water and greenhouse gases

Food type	Energy MJ/unit	Land ha/unit	Water m^3/unit	GHGs $kgCO_2e$/unit	Unit
Alcoholic beverages	5.18	0.000098	1.73	1.01	kg
Dairy products	6.55	0.000123	2.42	1.08	kg
Fish	72.73		1.13	3.55	kg
Fruit and vegetables	7.06	0.000067	2.12	1.38	kg
Grain, starches & derived products	16.44	0.000173	2.1	0.92	kg
Meat & meat products (excl. poultry)	78.82	0.001352	6.54	10.96	kg
Poultry meat& products	34.29	0.00064	2.41	5.76	kg
Eggs	26.04	0.000569	2.47	4.3	kg
Vegetable and animal oils and fats	33.15	0.002621	7.2	0.97	kg
Other food products (incl. sugar)	23.01	0.000157	1.86	5.44	kg

This section summarises the conversion factors used for each of the environmental metrics. Wherever possible a single data source has been used within one metric – this is to ensure internal consistency and comparability within each metric. This approach was preferable to pooling many individual studies as differences in boundaries, assumptions and accounting methods would make the results incomparable.

It is important to note that the tool assumes production impacts are the same in all countries, despite the likelihood of different regions having different eco-efficiencies (due to differences in weather, land & feed quality, mechanisation, etc). These differences are being demonstrated in a growing number of life cycle assessment studies e.g. the FAO Dairy LCA demonstrated a five fold differences in emissions per unit production of milk between regions of the world[6].

A similar simplification was used in the WWF/FCRN study 'How low can we go'[7] and is considered to be the most significant assumption made within our model. The ultimate aim would be to adjust environmental impact of production depending on geographic location; however insufficient data exists across all impact factors to achieve this within the scope of our project.

[6] http://www.fao.org/docrep/012/k7930e/k7930e00.pdf
[7] http://assets.wwf.org.uk/downloads/how_low_can_we_go.pdf

In the tables that follow, details are provided on the data sources and key assumptions e.g. geographic relevance, age and data boundaries, etc.

2.1.1.1 Energy

Two data sources were used for the energy impact of food production. Both studies are based on quite old data – however no newer single publicly available database of food energy factors for all food groups was found during the literature research[8]. For the purposes of comparisons between food groups this wasn't seen as a major problem.

Source	Table for one, INCPEN[9]
Used for …	All food categories
Year	Published 2009 (original data 1995)
Geography	UK
Scope	Cradle-to-farm gate
Exclusions	Waste management – however this not considered significant energy impact on farm
Adjustments made to data	Energy associated with meat in INCPEN has been split into 'poultry' and 'meat excluding poultry' based in energy information from a study by Coley et al (see below). Fruit and vegetables energy factor has been combined into one factor as a weighted average using the average amount of fruit and vegetables consumed per person in the UK (based on FAOSTAT food consumption data for the UK). "Other foods" group includes sugar, preserves, snacks/confectionary, tea/coffee and other foods. The factor has been weighted in the same way as fruit and vegetables.

Source	Embodied Energy of Food: Coley et al. University of Exeter Study[10].
Used for …	Poultry
Year	1998
Geography	UK
Scope	Cradle-to-farm gate
Exclusions	None known
Adjustments made to data	Energy associated with meat in INCPEN has been split into poultry and meat excluding poultry based in energy information from the study Embodied Energy of Food: Coley et al. University of Exeter Study[11].

[8] The following more recent study includes energy data for some of the food groups, and has been used to check the validity of the figures used in this section: Wasted Food, Wasted Energy: The Embedded Energy in Food Waste in the United States, 2010, A. Cuellar, M.Webber, Environ. Sci. Technol

[9] http://www.packagingfedn.co.uk

[10] http://centres.exeter.ac.uk/cee/coley/food.pdf

[11] http://centres.exeter.ac.uk/cee/coley/food.pdf

2.1.1.2 *Agricultural land*

Two good quality data sources were used for this impact category: the Global Footprint Network's National Footprint Accounts and a UK government-funded life cycle assessment of agricultural and horticultural products.

The National Footprint Accounts underpin the WWF One Planet Living reports which calculate the per capita ecological footprint[12] of different nations.

The UK Cranfield LCA was needed for meat products – not included in the National Footprint Accounts in a format that is easily accessible.

Source	Global Footprint Network, National Footprint Accounts[13]
Used for …	'Alcoholic beverages', 'fruit and vegetables', 'grain & starchy and derived products', 'vegetable and animal oil', 'other food products', 'fish'.
Year	2003 & 2006
Geography	World average
Scope	Cradle-to-farm gate
Exclusions	None known
Adjustments made to data	'Other food products' was assumed to be sugar which comprises 74% of the food not registered under other groups, according to FAOSTAT statistics. Vegetable and animal oil factor has been approximated to vegetable oil. Fish area relates to hectares of continental shelf – the location of commercial fishing

Source	'Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities', Cranfield University[14]
Used for …	Meat, eggs & dairy
Year	2006
Geography	UK
Scope	Cradle-to-farm gate, includes impact of animal feeds
Exclusions	None known
Adjustments made to data	'Dairy product' factor is based on Cranfield data on milk. To include the impact of butter and cheese in the dairy group an uplift has been applied to milk using data from a Scottish dairy sector study currently being undertaken by Best Foot Forward. Beef, pork and sheep are included in the 'meat (excl. poultry)' group. The factor is derived from a weighted average based on the total annual production of these three types of meat.

[12] The ecological footprint is a sustainability metric which measures natural resource and is expressed in global hectares (different in a number of significant ways from agricultural land use). This project utilised underlying assumptions on world average crop yields expressed in conventional hectares.

[13] http://www.footprintnetwork.org/gfn_sub.php?content=nrb

[14] http://www.cranfield.ac.uk/sas/naturalresources/research/projects/is0205.html

2.1.1.3 Water

Two data sources were used for the water footprint of food products – both from the leading organisation in this field: the Water Footprint Network.

Source	Hoekstra, A.Y. and Chapagain, A.K. Globalization of water: Sharing the planet's freshwater resources, Blackwell Publishing, Oxford, UK[15].
Used for …	All foods, except for fish
Year	2008
Geography	UK (data is available for all counties)
Scope	Cradle-to-processing
Exclusions	None known
Adjustments made to data	Fruit and vegetables factor has been combined into one factor as a weighted average using the average amount of fruit and vegetables per person (FAOSTAT data). Other food factor has been combined in the same way as fruit and vegetables using factors for sugar, nuts and oil seeds.

Source	Fish water footprint factor is based on the study: Virtual Water Trade, Proceedings of the international expert meeting on virtual water trade, IHE Delft[16]
Used for …	Fish
Year	2003
Geography	World average
Scope	Cradle-to-gate
Exclusions	None known
Adjustments made to data	Fish factor has been assumed as the average of the range presented in the study Virtual Water Trade

[15] http://www.waterfootprint.org/?page=files/Productwaterfootprint-statistics
[16] www.waterfootprint.org/Reports/Report12.pdf

2.1.1.4 Greenhouse gases

There is a wealth of life cycle studies which examine the climate change impact of food production, however it was felt important to use a single source for this impact category. The REAP dataset was chosen as it is current, groups foods into useful categories and is UK –specific. It uses a combination of input-output methodology and process data – and has a specific food model.

Source	REAP (Stockholm Environment Institute)[17]
Used for …	All food categories
Year	2003-5
Geography	UK consumption
Scope	All GHGs, cradle-to-farm gate
Exclusions	None known
Adjustments made to data	GHG total emissions are reported in REAP per capita. Emissions factors per mass of food were back calculated using UK population data (provided in REAP) and FAOSTAT data on UK food consumption from the same data year.

[17] http://www.resource-accounting.org.uk/downloads/?page=downloads

2.1.2 *Organic foods*

When specifying the tool it was acknowledged that, to date, life cycle studies have shown organic production is not universally 'better' for the environment across all indicators. As a result it was felt important to include the ability to explore the tensions & synergies that appear in some food groups between decisions over organic or conventional foods (one of the few food procurement options available which relate explicitly to production methods).

It is worth noting that, in reality, agricultural systems are far more diverse that just organic or non-organic – and some other system variables are just as environmentally significant. For instance: farmer resource efficiency; how livestock manure is managed; the types of feed available; or local/regional climates & soils.

When users specify the percentage of a food group which is organic, an uplift factor is applied to the conversion factors detailed in the previous section (see Table 2). The uplift has been estimated for energy, GHG emissions and land using the Cranfield agricultural LCA study[18].

The well-respected Swiss life cycle database ecoinvent has been used for water. This uplift factor has been derived from several types of crops: barley, fava beans, grain maize, hay, potatoes, protein peas, rape seed, rye, soy beans and wheat grains. The same uplift is applied to all food groups, if relevant, since it was the only factor available.

Alcoholic beverages uplift comes from Cranfield study on wheat (there are no other cereals in the study); 'other food products' is an average of all food categories, excluding beverages.

Table 2: Uplift factors for organic production

	Energy	GWP	Land	Water
Alcoholic beverages	71%	98%	314%	104%
Dairy products	62%	116%	166%	104%
Fish	Uplift not applied – no data			
Fruit and vegetables	75%	95%	273%	104%
Grain mill products; starches and starch products	86%	95%	289%	104%
Meat and meat products (excl. poultry)	77%	87%	194%	104%
Poultry meat and poultry meat products	132%	146%	219%	104%
Other food products (incl. sugar)	91%	111%	228%	104%
Eggs	114%	127%	224%	104%
Vegetable and animal oils and fats	75%	95%	273%	104%

[18] Determining the environmental burdens and resource use in the production of agricultural and horticultural commodities, 2006, Cranfield University

2.1.3 Processing

As the tool is aimed at those procuring food on larger scales, it is assumed that pre-processing to goods, such as ready-meals and similar goods, is not applicable – instead it is assumed most food is purchased with minimal pre-processing e.g. flour, milk. This more limited level of processing is captured in food production conversion factors detailed in Section 2.1.1.

Additionally, some studies have demonstrated energy (and GHG emissions) savings through the industrial preparation of meals when compared to the same meal cooked at home[19] and so a blanket adjustment for processing has questionable validity. It is suggested that the benefits of unprocessed foods are quite often more a question of nutrition, food quality & cultural 'connectedness' with food (i.e. it cannot be considered so much of an environmental issue[20]).

The environmental impact of packaging production is, however, included at the end-of-life stage (see Section 2.3.2.2).

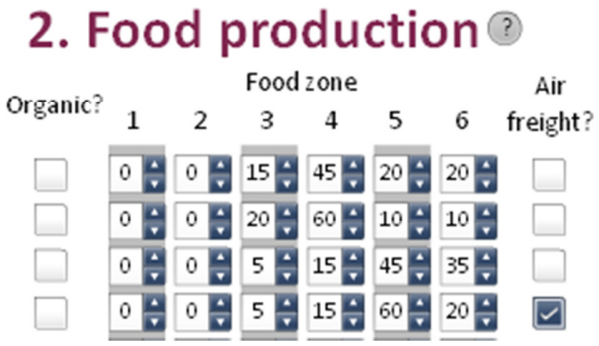
2.2 Distribution

The users are able to select the origin of the food for each food group. The origin is aligned with Growing Communities 'Food Zones' terminology and definitions[21].

The figure below shows value boxes, which users manipulate to adjust where food comes from (percentage by mass). Row totals must equal 100.

Column 6 ('rest of world') can be either all sea freight – or air freight (if the box is ticked).

Figure 3: Screenshot of food zone slider control



The default values have been derived using Defra & UN statistics and expert judgement. They represent a likely UK typical scenario.

[19] The Validity of Food Miles as an Indicator of Sustainable Development, AEAT for Defra, 2005

[20] Food processing effluent is one obvious exception to this (but is not captured well by our four indicators)

[21] http://www.growingcommunities.org/start-ups/what-is-gc/manifesto-feeding-cities/explore-food-zones/

The following table shows the distances and mode of transport assumed in each food zone. All distances reflect one way journeys and adjustments have been made for average loading.

Table 3: Food transport assumptions

Food Zone	Small truck km	Average HGV km	Sea freight km
Urban	5[22]		
Peri-urban	15[22]		
Hinterland		50[22]	
Rest of the UK		122[23]	
Rest of EU		751[24]	
Further afield		1,502[25]	10,269[26,27]

[22] BFF estimate

[23] Average length of haul for other foodstuffs in 2009, DfT statistics. www.dft.gov.uk
135 km for Alcoholic beverages group.

[24] Average trip (one way) in international road haulage by UK in 2009. Road Freight statistics, DfT

[25] Following EcoInvent (www.ecoinvent.ch) approach for international transport of goods, road transport has been estimated as twice the distance from EU goods to the UK.

[26] Average distance of non-EU countries. Distances based on http://e-ships.net/dist.htm.
The average distance is a weighted average using the annual tonnage imported from the non-EU countries to the UK. Based on the report The Validity of Food Miles as an Indicator of Sustainable Development, AEAT for Defra, 2005

[27] 1% of this distance is assumed to be covered by air freight in the Fruit & vegetables and Fish groups. Based on the report The Validity of Food Miles as an Indicator of Sustainable Development, AEAT for Defra, 2005

2.3 Use & End of Life

2.3.1 *Cooking & refrigeration*

Energy (and resulting emissions) associated with refrigeration and cooking of food groups are derived from the INCPEN study[28] (see Table 4). The user is able to affect GHG emissions by entering the proportion of electricity & heat supplied by good quality renewables (as defined by Defra GHG reporting guidelines). Energy footprint is not affected by this adjustment.

Table 4: Energy and GHG emissions associated with cooking and refrigeration

Food type	Energy MJ/kg	Emissions kgCO2e/kg
Alcoholic beverages	1.30	0.22
Dairy products	7.26	1.24
Fish	16.36	2.64
Fruit and vegetables	3.86	0.54
Grain, starches & derived products	11.40	1.71
Meat & meat products (excl. poultry)	28.18	4.31
Poultry meat& products	28.18	4.31
Eggs	21.88	3.15
Vegetable and animal oils and fats	5.52	0.95
Other food products (incl. sugar)	0	0

Assumptions:

- The same energy data has been used for all meat types
- The GHG factors were derived from the INCPEN energy data. Cooking energy has been split into gas and electricity[29] while refrigeration is all allocated to electricity. Energy to GHG conversion factors come from Defra 2010[30]

[28] Environmental impact of packaging in the UK food supply system, 1996, INCPEN (The Industry Council for Packaging and the Environment)

[29] Defra consultation, Annex 12, http://www.defra.gov.uk/corporate/consult/energy-using-products

[30] http://www.defra.gov.uk/environment/business/reporting/

2.3.2 *Waste*

Two types of waste are considered in the tool: food waste and packaging waste.

2.3.2.1 *Food*

Food waste has two environmental impacts which are captured in this tool:

1. Greenhouse gas emissions and energy use associated with the management of waste e.g. transport to treatment facility, processing emissions (e.g. methane). Emissions factors for this are taken from standard sources e.g. Defra GHG Reporting Guidelines.
2. As the tool models the quantity of food consumed by a population, any wastage at use requires additional production of resource to meet that diet demand. For example, if 10% of dairy food is wasted at use, for a given population to eat 200kg of dairy per person per year, an additional 10% (20kg) of production is required. This 'overhead' is be included in the footprint.

The user can choose the percentage (by mass) of food wasted at use and its waste management route (landfill or compost). To help the user the tool is set to a default (UK typical) level: In UK the average waste disposed in percentage of the food we buy is shown in the following table[31]:

	Food waste
Alcoholic beverages	12%
Dairy products	9%
Fish	23%
Fruit and vegetables	43%
Grain mill products; starches and starch products	37%
Meat and meat products (excl. poultry)	23%
Poultry meat and poultry meat products	23%
Other food products (incl. sugar)	22%[32]
Eggs	9%
Vegetable and animal oils and fats	17%

Post harvest losses are not considered, as it is assumed that agricultural production conversion factors already account for this waste. Distribution losses were not included as they are small in comparison to waste at consumer[33].

The environmental impact of food waste management of all types is modelled using the same conversion factors (i.e. meat is no different to vegetables). Greenhouse gases are modelled using the latest factors from Defra's GHG Reporting Guidelines. Energy is estimated from the same source assuming 10 km distance to the landfill site, transported in an average truck.

[31] Household Food and Drink Waste in the UK, 2009, WRAP

[32] Average of all food types

[33] Parfitt, J. (2010) Food waste within food supply chains: quantification and potential for change to 2050. Phil. Trans. R. Soc. B (2010) 365, 3065–3081

2.3.2.2 *Packaging*

Until this point packaging impact has not been included (i.e. food production impacts have related just to the edible material). Modelling packaging at disposal phase (as opposed to at production) offers the user the opportunity to more accurately explore packaging impacts specific to their situation.

Packaging waste is not modeled at food category level – but as a single quantity. The user enters the total quantity of material wasted and its waste management route. The types of material to be modeled are:

- Plastic
- Paper and cardboard
- Metal
- Glass
- Unknown (UK average mix of above)

The types of management fate for the above materials are as follows:

- Landfill
- Recycling
- Incineration
- Unknown (UK average for above materials)

In terms of data sources, the tool models GHG emissions using factors from Defra's GHG Reporting Guidelines and energy impacts from Bath ICE database. Where energy impact is not available for recycling and incineration, the impact has been estimated based on Defra GHG factors. Water and land use is not be modelled.

Table 5: Energy and GHG emissions associated with packaging waste management

Waste type	MJ/kg	$kgCO_2e/kg$	End of Life
Paper and card	12.94	0.24	recycled open loop
	22.95	0.45	incinerated
	72.30	1.50	landfill
Glass	13.30	0.53	recycled closed loop
	16.71	0.85	incinerated
	16.80	0.85	landfill
Plastic	47.76	1.55	recycled closed loop
	147.95	4.90	incinerated
	84.80	2.84	landfill
Metals	21.00	1.90	recycled closed loop
	123.94	6.67	incinerated
	128.34	7.06	landfill

The 'paper and card' category assumes 50% of each by mass. Plastic is 50% plastic film and dense plastic. Metals are 50% steel and aluminium.

To help the user, the waste quantity is set to a default – it is assumed that in the UK the average packaging mass is 10% of the total purchased food mass[34].

The UK average packaging waste mix by mass has been estimated as 53% cardboard, 20% glass, 20% plastic and 7% metals[35]. The UK average figures on waste disposal are 72% landfill, 9% incineration and 19% recycled[36].

It is important to note that the relationship between packaging and life cycle environmental impact is not a straightforward one. Packaging serves to protect food during transport and so reduce wastage. A complete removal of packaging would, in some cases, be counterproductive and increase agricultural production demands (where much of a foods environmental impact lies). There is however an optimal level of packaging which delivers the protection function with minimal impact (e.g. through lightweighting and use of recycled/reused materials). Due to the complexities and food-specific nature of this relationship, the tool does not explore this tension.

[34] Environmental impact of packaging in the UK food supply system, 1996, INCPEN (The Industry Council for Packaging and the Environment)

[35] Defra statistics on household waste. Paper and cardboard, glass, plastic and metals are assumed to be associated with packaging

[36] www.wasteonline.org.uk

3 Food system characteristics

Apart from reporting environmental impact, the results of the tool are further interpreted through two lenses: dependence on global trade; and food zone land availability.

3.1 Dependence on trade

Based on the user's selection of food production location, a small chart shows proportion of food imported. It is felt important to highlight this as over-dependence on imported foods, or conversely over-dependence on local sources. Both could be viewed as a supply chain risk; the former being exposure to erratic trade, the latter exposure to localized production failure, for example.

3.2 Land availability

The underlying assumption here is that agricultural land is a finite resource. The conversion of more natural land to agriculture cannot be supported due to adverse impacts on greenhouse gas emissions, biodiversity and ecosystem services. We must therefore live within constraints of available agricultural land to equitably deliver food for all.

It is within this context that the tool provides estimates of per capita land availability for the different food zones. As in other calculations, some significant simplifications need to be made. The major ones being that: differential land quality has not been modelled; land is not split out into pasture & crop.

Figure 4 and

Table 6 summarise how global agricultural land availability was shared between the food zones. The assumptions and calculations underlying this are outlined afterwards.

Figure 4: Agricultural land availability per capita, by food zone

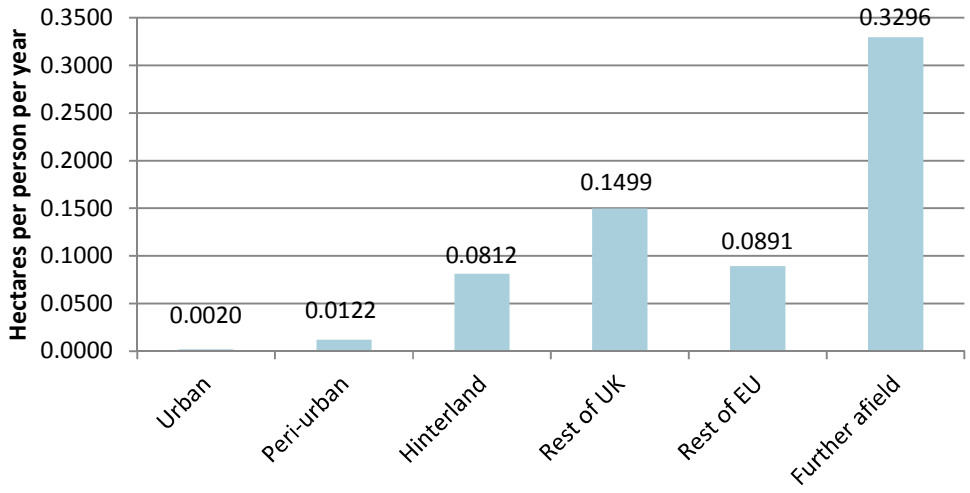


Table 6: Agricultural land availability per capita, by food zone

Food Zone	Available Land (ha per capita)
Urban	0.0020
Peri-urban	0.0122
Hinterland	0.0812
Rest of the UK	0.1499
Rest of EU	0.0891
Further afield	0.3296
Total[37]	**0.6640**

Land availability assumptions & calculations

It was assumed that the food zones model encourages agricultural land nearer to populations to be used preferentially for producing food for local consumption. It does, however, appreciate that transport from distances further afield is necessary.

The items below summarise the main calculations involved in developing the land availability.

1. Fundamentally, it was assumed that – at a global level – each person has 0.6620 hectares of agricultural land currently theoretically available to them[38]. It was assumed that this does not include 'urban' land which could be used for food production.
2. Urban land availability has been derived using production estimates in 'City Harvest: The feasibility of growing more food in London' by Tara Garnett (1999)[39] (see
3.
4.
5. Table 7)
6. Total UK agricultural land availability (14,778,000 hectares) was shared between the population (60,739,000 people) to give per capita share of 0.2233 hectares/person within the UK.
7. This total UK land was allocated between:
    a. Peri-urban (5%): BFF estimate
    b. Hinterland (25%): assuming this includes land stretching 100 miles from a city[40]
    c. Rest of UK (70%): total UK area minus peri-urban and hinterland

[37] Equals world share + urban

[38] Total agricultural land: 4,364,775,950 hectares. (Grazing: 2,814,355,170 hectares; Crop: 1,550,420,780 hectares). World population: 6,592,899,000

[39] London could produce 232,000 tonnes of fruit and veg at 10.7 tonnes/hectare. http://www.fcrn.org.uk/researchLib/PDFs/CityHarvest.pdf

[40] Growing Communities Food Zone definition

8. Total European land share was estimated by dividing EU agricultural land hectares (153,755,680 hectares) and population (462,495,883 people): 0.3324. The UK per capita land availability was subtracted from this to give 'Rest of Europe' land share of 0.0891 hectares/person/year.
9. Finally, UK and EU land share were subtracted from total global land availability per person (see point 1) to provide 'Further afield' land share of 0.3296 hectares/person/year.

Table 7: Urban land availability in London (Garnett, 1999)

Land type	Hectares	% of land for horticulture	Hectares for horticulture
Agricultural land	13,566	50%	6,783
Other green belt land	40,034	20%	8,007
Allotments	831	100%	831
City farms	51	25%	13
Community gardens	20	25%	5
Public open space	14,617	5%	731
Derelict/vacant land	1,388	1%	14
Gardens	38,014	14%	5,322
Total			21,705
Food zones 'urban'[41]			**14,922**

[41] Excluded 'Agricultural land' as this already counted in peri-urban