food footprints a Carbon Conversations game

This game explores four different factors which account for the embodied emissions in food. It is suitable for 4-6 players.

How to play

You should have 1 cloth playing board and 48 cards, showing 12 foods in 4 categories, Production, Processing, Packaging and Transport. The goal is for the group to place the cards for 12 different foods in order, according to whether they have high or low emissions in each of the 4 categories.

Shuffle the cards and deal them amongst the players. Players take it in turn to read out one of their cards and place it on the board, saying why they think it should be placed there. You can either focus on one food at a time or allow people to play whichever card they wish. If you are short of time you can remove some sets of cards, but make sure you leave a varied selection. As more cards are played, the group should discuss the order in each category and adjust it, till they are satisfied with the answer.

Check the answers against the chart overleaf.

Frequently asked questions

What's the difference between production and processing?

Production covers everything that happens on the farm, (often an industrialised, high-tech environment), growing crops and rearing animals. Processing happens in the packing station or factory and covers everything from trimming celery to freezing peas or creating an entire ready-meal. Check Chapter Four of *In Time for Tomorrow?* for details.

Which category is responsible for most emissions?

About 45% of the UK's food emissions come from the production stage, about 28% from processing, 7% from packaging and 19% from transport. Individual foods can be high in one category and low in another.

How can you discover the exact emissions of an item of food?

Researchers have to carry out a life-cycle analysis 'from plough to plate' for every item. See Chapter Four of *In Time for Tomorrow?* for details and for guidance on how to eat a low-carbon diet.

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Carbon Conversations

www.carbonconversations.org • *Game created by Andy Brown and Rosemary Randall*

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Emissions associated with food

		Production	Processing	Packaging	Transport
Highest emissions	E	British beef ready-meal; Irish mature cheddar.	Frozen chicken nuggets from Thailand.	Locally brewed beer in an aluminium can.	Californian strawberries.
	D	Frozen chicken nuggets from Thailand.	British beef ready-meal; tomato ketchup in a plastic bottle.	Bottle of New Zealand wine; tinned Italian tomatoes.	Bottle of New Zealand wine; frozen chicken nuggets from Thailand.
	C	Bottle of New Zealand wine; wholemeal sliced bread; locally brewed beer in an aluminium can; tomato ketchup in a plastic bottle.	Wholemeal sliced bread; Irish mature cheddar; bottle of New Zealand wine; tinned Italian tomatoes; locally brewed beer in an aluminium can.	Tomato ketchup in a plastic bottle ; British beef ready-meal.	Tomato ketchup in a plastic bottle; British beef ready-meal; tinned Italian tomatoes; Spanish celery; dried lentils from India.
	B	Dried lentils from India; Spanish celery; Californian Strawberries; tinned Italian tomatoes.	Dried lentils from India; Spanish celery; Californian strawberries.	Californian strawberries; frozen chicken nuggets from Thailand; wholemeal sliced bread; dried lentils from India; Irish mature cheddar; Spanish celery.	Wholemeal sliced bread; Irish mature cheddar; locally brewed beer in an aluminium can.
Lowest emissions	A	Apples from the garden.	Apples from the garden.	Apples from the garden.	Apples from the garden.

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Lowest emissions	A	Apples from the garden.	Apples from the garden.	Apples from the garden.	Apples from the garden.

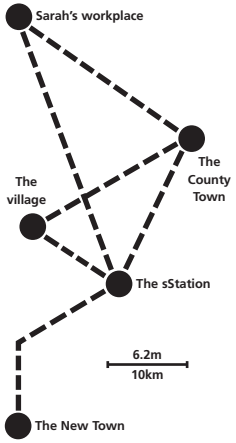
travel dilemmas

a Carbon Conversations game

This game explores the problems of a rural, commuting family with a high travel footprint. It is suitable for 4-6 players. The group's task is to discuss changes the family could make to reduce their footprint in the light of various policy changes.

The family

Edward and Sarah live in a village 12 miles from an attractive, historic County Town. They have two children, Chloe, 12 and Jessica, 10. Both children are at private school in the County Town.



Sarah works in a small industrial town 15 miles away. She drops the children at school in the County Town before driving on to work. They stay on for after-school activities or in the after-school club and she picks them up again at 6 pm. Her car is an old 4 x 4, Band G which she is very fond of. It's useful for the dog and for family holidays and she feels safe driving it. Her daily commute is a round trip of 50 miles – 11,000 miles a year. Husband Edward works in a big city 60 miles away. He drives 6 miles to the station in a medium sized Band E car where he picks up the train. His annual car commute is 2,760 miles and his train commute 23,000 miles.

Living in the country means the family drive significant distances to see friends, to take the children to social activities and to shop. It is common for both parents to drive into the County Town twice at a weekend. Although there is a Park and Ride scheme, they don't use it.

The family enjoy foreign holidays. They spend half-term breaks in the UK but might go to Thailand at Christmas and to the USA in the summer. They like to go skiing at Easter and take weekend breaks in Europe.

Edward could take a bus to the station but it takes longer than the car journey and he would lose flexibility. The children could also get to school by bus but the journey is slow and Sarah thinks they would find it hard on days when they have to carry sports or music equipment. She also values the time to chat on the journey. There is no bus between the village and the town where Sarah works.

How to play

You should have 1 cloth playing board, 12 Smarter Travel cards, 10 Lifestyle Change cards and 12 Policy Change cards. Place the cards in the places indicated on the board, making sure each stack is in the correct order, with number one at the top. Players take it in turns to pick a card from any of the three piles and read it aloud. Your goal is to see if the family can halve their 46 tonne footprint.

travel dilemmas

a Carbon Conversations game

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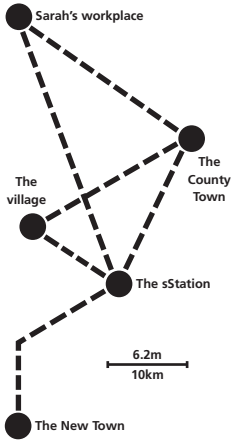

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Carbon Conversations

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www.carbonconversations.org • *Game created by Andy Brown and Rosemary Randall*

Last year's family footprint

	Miles	*Tonnes of CO_2*
Cars – commuting	13,760	5.72
Cars – social & leisure	16,100	6.51
Train – commuting	23,000	2.30
4 return flights to Thailand		18
4 return flights to USA		12
4 return flights to Prague		2
Total emissions		**46.53**

Smarter Travel and Lifestyle Change cards

If you pick a Smarter Travel or Lifestyle Change card, imagine what the family would be likely to do. Would they make this change voluntarily? Place the card in the appropriate Yes or No area of the board, depending on the group's opinion. If the group tends towards a 'maybe' decision, or is divided, you can place the card halfway between Yes and No with the option of moving it later. The greater the number of stars on the card, the greater the CO_2 savings.

Policy Change cards

When you are discussing the Policy Change cards, imagine you are a government, who are not afraid of the electorate. You want to act on climate change and are prepared to show leadership. Would you introduce this policy? The Policy Change cards may affect the family's attitude to Smarter Travel and Lifestyle Change choices. If one is placed in the Yes area of the board, the group should then review whether the family might reconsider any of the Smarter Travel or Lifestyle Change options.

Alternative version

Divide the group into three. Each group takes one set of cards and looks at them together. The group with Policy Change cards are the government. The other two groups should think about the family. Each group takes it in turns to play a card. This is sometimes a quicker way to play the game.

Frequently asked questions

How much does each action save?

The CO_2 savings for each action vary depending on what other actions are taken. For instance, Sarah could save 700 kg per year by driving more carefully in her old car or 2,000 kg (2 tonnes) by buying a smaller, more efficient car. If she both drives more carefully and buys the new car however, the total savings will be only 2,500 kg not 2,700 kg. As she makes more changes this effect becomes more significant.

Are there values for the stars on the Smarter Travel and Lifestyle Change cards?

Yes:

* up to 200kg
** between 200 and 500 kg
*** between 500 kg and 1 tonne
**** between 1 and 2 tonnes
***** over 2 tonnes

How many stars do the family need to halve their CO_2 emissions?

The interactions between different elements make it difficult to specify the number of stars. Good savings come from changing to more efficient cars, lowering the speed, adjusting driving habits, moving home, jobs or schools, and eliminating all air travel.

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Possible savings

Good Housekeeping	CO_2 saving
Defrost fridge & freezer regularly	50-100 kg
Close curtains at dusk & close doors of rooms when not using them	50-100 kg
Reduce dishwasher temperature to 55°C and only run when full	50-100 kg
Reduce washing machine temperature to 40°C and only run when full	50-100 kg
Turn off lights when not in use	50-100 kg
Turn everything off standby	50-100 kg
Stop overfilling the kettle	50-100 kg
Review on/off times for heating	100-200 kg
Take short showers instead of baths	100-250 kg
Read gas, electricity and water meters every month or sign up for smart metering	100-250 kg
Turn room thermostat down one degree, from 21 °C to 20 °C	150-300 kg
Turn room thermostat down two degrees, from 20 °C to 18° C, also remembering to turn radiators off/down when rooms aren't being used	200-400 kg
Weekend Jobs	
Shelves, close-fit curtains and foil for radiators on external walls	50-100 kg
Insulate all hot water pipes	50-100 kg
Replace dishwasher with A+++ rated model	50-100 kg
Replace washing machine with A+++ rated model	50-100 kg
Scrap tumble dryer/minimise its use	75-100 kg
Put fridge & freezer in the coolest places possible	75-100 kg
'Shrink wrap' all single-glazed windows	100-200 kg
Fit secondary glazing to all single-glazed windows	100-200 kg
Replace fridge freezer with A+++ model	100-200 kg
Replace any remaining incandescent light bulbs with energy efficient ones	100-250 kg
Buy chimney balloons to seal open-fire chimneys when not in use	200-400 kg
Top up loft insulation to 300 mm	250-500 kg
Fit draught stripping to all doors and windows	250-500 kg
Building work	
Fit thermostatic valves to all radiators	75-200 kg
Supplement cavity wall insulation with 50-100 mm external insulation on side wall	100-200 kg
Insulate under the ground floor	100-250 kg
Install heat recovery extract fans in bathroom & WC	125-300 kg
Supplement cavity wall insulation by dry-lining internally with 50 mm insulation	200-400 kg
Replace all single-glazed windows with new high performance double or triple-glazed units	200-400 kg
Fill cavity walls with 50 mm insulation	400-900 kg
Replace gas boiler with most efficient condensing gas boiler including efficient controls	500-1500 kg
Insulate all external walls with 100 mm insulation, leaving the cavity unfilled	750-1500 kg
Dry-line all walls internally with 100-150 mm insulation leaving the cavity unfilled	750-1500 kg
Low-carbon/renewable technologies	
Install solar panels for hot water	150-350 kg
Install 2 kW of photo voltaic panels to generate electricity	500 kg
Replace gas boiler with an air-source or ground-source heat-pump	750-2000 kg

low-carbon house

FAMILY VERSION

a Carbon Conversations game

This game models the changes that could reduce the emissions of a 1930s semi-detached house which is owned by a family of four. The game is suitable for 4-6 players. The group's task is to work out the best way to reduce the house's CO_2 emissions from 9 tonnes to 3 tonnes a year.

The house

The house has four, spacious bedrooms, living room, dining room, utility room, large kitchen and hall. There is a downstairs WC and an upstairs bathroom with a WC, bath and power shower. It is built of brick and has unfilled cavity walls. It faces North. There is 50 mm of insulation in the loft. Some work was done on the house about 20 years ago when the kitchen was refitted and UPVC double-glazing was installed on the front. The windows on the back are original – steel and single-glazed. There is one, small, single-glazed window on the side of the house. The house has gas central heating with a time-clock and thermostat in the hall. The boiler is over 25 years old. It remains reliable but is extremely inefficient. There are original open fire-places in the living room and dining room. The thermostat is usually set at 21 °C. The house's Energy Performance Certificate rates it 'F', the second from lowest score.

The family

Parents: Ryan and Sally; children, Ruby (11) and Max (8). They are a middle-income family who own the house with a mortgage. They bought the house a year ago and have no plans to move. They were surprised at how cold and draughty the house felt last winter. Their gas and electricity bills are high (about £2,000 for the year) and they are vaguely aware of climate change and the need to save energy.

The family have a large range of electrical appliances: washing machine, tumble drier, fridge-freezer, dish-washer, microwave, 3 TVs, several laptops, tablets and phones, vacuum cleaner, lawn-mower, hedge-trimmer and other gadgets.

Carbon Conversations

www.carbonconversations.org • *Game created by Andy Brown and Rosemary Randall*

To play

You should have: 1 cloth playing board; 38 playing cards of various sizes in 4 categories: Good Housekeeping, Weekend Jobs, Building Work and Low-Carbon/Renewable Technologies; 6 Updates cards. Distribute the playing cards between the players and place the Updates cards in the place marked on the board.

Discuss what the family should to reduce the house's emissions in Year 1, choosing from the options on the cards you each hold and placing the cards on the board. When the Year 1 space has been filled, turn over the first Update card before filling in the Year 2 space. Continue in the same manner, picking an Update card when each Year's space is full, until the target of 6 tonnes has been reached.

Prices

Where two prices are given on the cards, the first price is the price of the materials alone and assumes that the job will be done as DIY. The second price is the price of both materials and labour and assumes that a contractor will be brought in to do the job.

Mutually exclusive cards

Note that some of the cards are mutually exclusive. There are three options for upgrading the windows: 'Shrink-wrap', cheap secondary glazing or replacement windows. Only one of these cards should be played, though you might choose to play the 'shrink-wrap' card early on and replace it with one of the other two later. There are two options for heating the house: a new condensing boiler and controls or an air-source or ground-source heat pump. Only one of these cards should be played. There are four options for wall insulation. If you opt for cavity wall insulation, you can then opt for supplementary internal or external insulation to top this up. If you opt for external or internal insulation alone, you should not also pick cavity wall insulation.

Frequently asked questions

What are the Green Deal, Renewable Heat Incentive and Feed-In Tariff?

These Government backed schemes may help meet some of the costs. The Green Deal offers loans for insulation and glazing, new boilers, solar hot water, PV and heat pumps. Repayments are made through fuel bills and should be covered by savings made on the bills. The Renewable Heat Incentive and Feed-In Tariff provide ongoing payments to homes installing solar thermal, heat-pumps and PV.

Why does the space on the board for 100kg gradually increase?

The carbon-savings for each measure vary, depending on the other measures taken. When several are done together, they interact. For example, cavity wall insulation on its own saves 900 kg and a condensing boiler on its own saves 1500 kg. When both are done they save 2175 kg not 2400 kg as the boiler is not having to work so hard in the insulated house. The higher number on each card shows the savings that would be made if the action was the only one taken. The lower number shows the savings that would be made if it was the last action taken. This effect becomes more significant as more actions are taken. The game models this by gradually increasing the space taken by 100 kg.

Is there a right answer?

No, but there are better and worse ways of tackling the problem! For instance:

- it is hard work doing all the 'Good housekeeping' measures at once;
- it is best to insulate before spending money on new ways of generating power.

Would I save the same in my house?

Not necessarily. The CO_2 savings have been calculated for this particular house. Exact savings depend on a house's size, construction, age, existing improvements and people's behaviour.

Possible savings

Good Housekeeping	*CO_2 saving*
Defrost fridge & freezer regularly	50-100 kg
Close curtains at dusk & close doors of rooms when not using them	50-100 kg
Reduce dishwasher temperature to 55°C and only run when full	50-100 kg
Reduce washing machine temperature to 40°C and only run when full	50-100 kg
Turn off lights when not in use	50-100 kg
Turn everything off standby	50-100 kg
Stop overfilling the kettle	50-100 kg
Review on/off times for heating	100-200 kg
Take short showers instead of baths	100-250 kg
Read gas, electricity and water meters every month or sign up for smart metering	100-250 kg
Turn room thermostat down one degree, from 21 °C to 20 °C	150-300 kg
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Weekend Jobs	
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Replace dishwasher with A+++ rated model	50-100 kg
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Scrap tumble dryer/minimise its use	75-100 kg
Put fridge & freezer in the coolest places possible	75-100 kg
'Shrink wrap' all single-glazed windows	100-200 kg
Fit secondary glazing to all single-glazed windows	100-200 kg
Replace fridge freezer with A+++ model	100-200 kg
Replace any remaining incandescent light bulbs with energy efficient ones	100-250 kg
Buy chimney balloons to seal open-fire chimneys when not in use	200-400 kg
Top up loft insulation to 300 mm	250-500 kg
Fit draught stripping to all doors and windows	250-500 kg
Building work	
Fit thermostatic valves to all radiators	75-200 kg
Supplement cavity wall insulation with 50-100 mm external insulation on side wall	100-200 kg
Insulate under the ground floor	100-250 kg
Install heat recovery extract fans in bathroom & WC	125-300 kg
Supplement cavity wall insulation by dry-lining internally with 50 mm insulation	200-400 kg
Replace all single-glazed windows with new high performance double or triple-glazed units	200-400 kg
Fill cavity walls with 50 mm insulation	400-900 kg
Replace gas boiler with most efficient condensing gas boiler including efficient controls	500-1500 kg
Insulate all external walls with 100 mm insulation, leaving the cavity unfilled	750-1500 kg
Dry-line all walls internally with 100-150 mm insulation leaving the cavity unfilled	750-1500 kg
Low-carbon/renewable technologies	
Install solar panels for hot water	150-350 kg
Install 2 kW of photo voltaic panels to generate electricity	500 kg
Replace gas boiler with an air-source or ground-source heat-pump	750-2000 kg

low-carbon house

TENANTS AND LANDLORD VERSION

a Carbon Conversations game

This game models the changes that could reduce the emissions of a 1930s semi-detached house which is rented from a private landlord by five students. The game is suitable for 4-6 players. The group's task is to work out the best way to reduce the house's CO_2 emissions from 9 tonnes to 3 tonnes a year.

The house

The house has four, spacious bedrooms, living room, dining room, utility room, large kitchen and hall. There is a downstairs WC and an upstairs bathroom with a WC, bath and power shower. It is built of brick and has unfilled cavity walls. It faces North. There is 50 mm of insulation in the loft. Some work was done on the house about 20 years ago when the kitchen was refitted and UPVC double-glazing was installed on the front. The windows on the back are original – steel and single-glazed. There is one, small, single-glazed window on the side of the house. The house has gas central heating with a time-clock and thermostat in the hall. The boiler is over 25 years old. It remains reliable but is extremely inefficient. There are original open fire-places in the living room and dining room. The thermostat is usually set at 21 °C. The house's Energy Performance Certificate rates it 'F', the second from lowest score.

The landlord and tenants

The landlord, Mike, bought the house eight years ago as an investment. He furnished it as cheaply as he could, providing a washing machine, tumble drier, fridge-freezer and basic furniture. He installed fire doors and a fire alarm system so he could let it to groups of students, but otherwise has made no changes.

The house is currently shared by five students (one of the downstairs living rooms is used as a bedroom). The students find the house cold, draughty and expensive to run. Their utility bills are about £160 a month. They are an environmentally aware group who are willing to try to save energy but would like the landlord to make some improvements too.

Carbon Conversations

www.carbonconversations.org • *Game created by Andy Brown and Rosemary Randall*

To play

You should have: 1 cloth playing board; 38 playing cards of various sizes in 4 categories: Good Housekeeping, Weekend Jobs, Building Work and Low-Carbon/Renewable Technologies. You do not need the Updates cards for this version. Distribute the playing cards between the players.

Phase One

Discuss what the tenants could do, choosing mainly from the Good Housekeeping and Jobs for the Weekend cards, to save 1.5 tonnes of CO_2. Place cards on the board to show your choices.

Phase Two

Mike, the landlord, has received a letter from the University Lettings Office saying that in future they will only handle homes that score C or higher on their Energy Performance Certificate. This means reducing the emissions from the house by 3 tonnes through changes to the fabric of the house (insulation, draught-stripping, glazing), heating system and micro-generation.

Mike realises it is in his best interests to upgrade the house. He is entitled to various grants and tax relief to the value of £2,500. He can apply for a Green Deal loan of £6,000 to help pay for insulation, new windows, solar thermal, PV, a new boiler and controls or a heat pump. He can borrow a further £12,000 independently against the value of the house. He thus has £20,000 to play with. He needs to do the work between mid-July when his tenants move out for the vacation and mid-September when they return.

Discuss what Mike should do, choosing from the Weekend Jobs, Building Work and Low Carbon/Renewable Technologies cards.

Phase Three

Discuss what Mike and the tenants could do to achieve the full 6 tonnes of savings, choosing from the remaining cards and placing them on the board.

Prices

Where two prices are given on the cards, the first price is the price of the materials alone and assumes that the job will be done as DIY. The second price is the price of both materials and labour and assumes that a contractor will be brought in to do the job.

Mutually exclusive cards

Note that some of the cards are mutually exclusive. There are three options for upgrading the windows: 'Shrink-wrap', cheap secondary glazing or replacement windows. Only one of these cards should be played, though you might choose to play the 'shrink-wrap' card in phase one and replace it with one of the other two in phase two. There are two options for heating the house: a new condensing boiler and controls or an air-source or ground-source heat pump. Only one of these cards should be played. There are four options for wall insulation. If you opt for cavity wall insulation, you can then opt for supplementary internal or external insulation to top this up. If you opt for external or internal insulation alone, you should not also pick cavity wall insulation.

Frequently asked questions

What are the Green Deal, Renewable Heat Incentive and Feed-In Tariff?

These Government backed schemes may help meet some of the costs. The Green Deal offers loans for insulation and glazing, new boilers, solar hot water, PV and heat pumps. Repayments are made through fuel bills and should be covered by savings made on the bills. The Renewable Heat Incentive and Feed-In Tariff provide ongoing payments to homes installing solar thermal, heat-pumps and PV.

Why does the space on the board for 100 kg gradually increase?

The carbon-savings for each measure vary, depending on the other measures taken. When several are done together, they interact. For example, cavity wall insulation on its own saves 900 kg and a condensing boiler on its own saves 1500 kg. When both are done they save 2175 kg not 2400 kg as the boiler is not having to work so hard in the insulated house. The higher number on each card shows the savings that would be made if the action was the only one taken. The lower number shows the savings that would be made if it was the last action taken. This effect becomes more significant as more actions are taken. The game models this by gradually increasing the space taken by 100 kg.

Is there a right answer?

No, but there are better and worse ways of tackling the problem! For instance:

- it is hard work doing all the 'Good housekeeping' measures at once;
- it is best to insulate before spending money on new ways of generating power.

Would I save the same in my house?

Not necessarily. The CO_2 savings have been calculated for this particular house. Exact savings depend on a house's size, construction, age, existing improvements and people's behaviour.