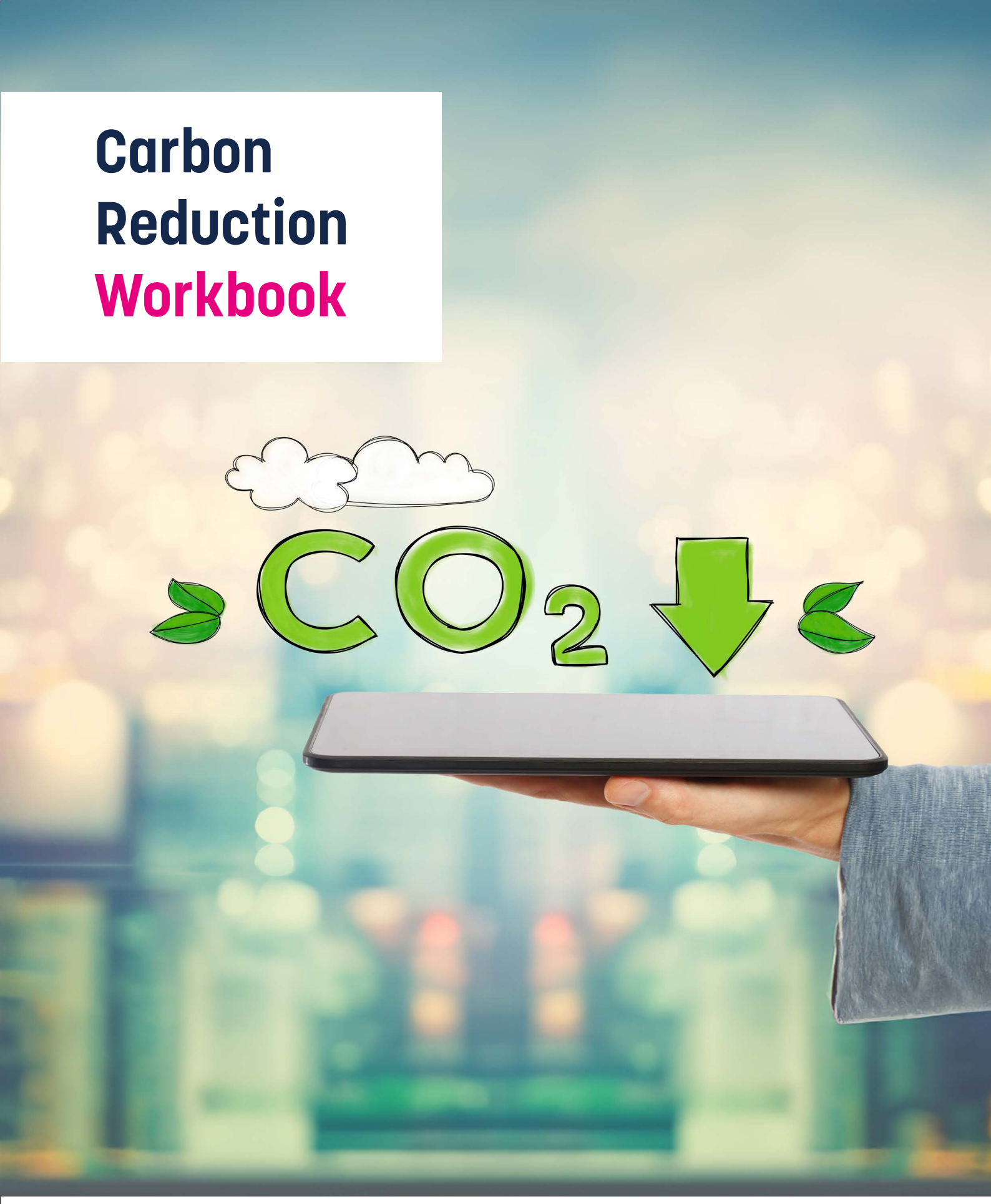
Carbon Reduction Workbook



Norfolk County Council

netzero Norfolk

Lesson One: To compare CO_2 emissions from cars in the context of fractions

390 units of CO_2 are emitted for a car used 6 times per week. How many units are emitted per day?

736 units of CO_2 are emitted for a car used 8 times per month. How many units are emitted per day?

Riley is 12 years old. His family car emits 9000 units of CO_2 per month. To avoid emitting more than 9000 units of CO_2 next month, which journeys can Riley make in the car?

Criteria:

- 1/3 of Riley's journeys must be for an educational purpose.
- 1/9 of Riley's journeys must be for sport.
- 1/9 of Riley's journeys must be for visiting family.
- 2/9 of Riley's journeys must be for social events.
- 2/9 of Riley's journeys must be for helping family with chores

The numbers in the table relate to the total emission of CO_2 per return journey. A journey can be made more than once during the month e.g. Riley can travel to school in the car for more than one day during the month.

Educational Purpose	
Church	150
School	450
Library	280
Maths tutor	270
English tutor	200
Football scholarship	300
Piano tutor	400
Spanish lessons	300
Violin lessons	200
Art class	175
French lessons	150
Sport	
Football club	650
Rowing club	700
Basketball training	350
Roller Skating	550
Trampolining	650
Rugby training	400
Golf	450
Swimming club	300
Judo	450
Kick boxing	600

Visiting Family	
Grandma's house	650
Sister's flat	200
Dad's house	150
Uncle's bungalow	175
Grandad's nursing home	200
Social Events	
Best friend's birthday party	500
Sleepover	400
Playing online at a friend's	300
Going to the park	250
Going into town	350
Visiting the arcade	150
Going to the beach	300
Cinema	400
Grandma's 70th birthday party	250
Family Chores	
Food shop	750
Taking rubbish to the tip	400
Taking the car to the car wash	300
Collecting a parcel	250
Collecting prescriptions	200
Taking sister to karate lessons	250

Lesson Two: To analyse energy bills and fuel costs in the context of fractions.

Dave was paying £950 but his bill has reduced by 1/5.
Amelia was paying £820 but her bill has reduced by 1/10.
Who is now paying the least for their energy?

Andy was paying £490 but his bill has decreased by 2/7.
Scarlett was paying £640 but her bill has decreased by 3/8.
Who is now paying the least for their energy?

Felix was paying £1100 but his bill has decreased by 3/11.
Beth was paying £810 but her bill has decreased by 2/9.
Rita was paying £900 but her bill has decreased by 2/15
Who is now paying the least for their energy?

Gas Company A are making changes to their prices. To match other energy suppliers, they have decided to reduce their gas tariffs by 2/9 and reduce their electricity tariffs by 1/5. What is the total fraction that Gas Company A are reducing their tariffs by?

Electricity Company B are analysing their accounts. On average last year, their customers saved 11/20 on their energy bills. Which combinations of fractions add together to make 11/20? (You will need to find more than one solution).

Lesson Three: To calculate differences between renewable and non-renewable energy using ratio and proportion.

Energy generated from wind power compared to solar energy can be expressed using the ratio 9:15.
How else can this ratio be expressed?

The rate of energy produced from hydroelectric power, solar panels and wind turbines can be expressed using the ratio 4:8:10. How else can this ratio be expressed?

E.on gains 5 new customers per minute compared to Scottish Power who gain 3 new customers per minute. How many customers will both companies have gained after 8 minutes?

The proportion of Government spending used on renewable energy is ¾ compare to non-renewable energy. What ratio can be used to express the relationship between Government spending on renewable and non-renewable energy? Explain how you know.

Lesson Four: To express increases in the current within a series circuit as a fraction.

Calculate the fractional increase in the following examples:

The current in a circuit increasing from 3 amps to 4 amps

The current in a circuit increasing from 4 amps to 6 amps.

The current in a circuit increasing from 4 amps to 7 amps.

The current in a circuit increasing by 2/3. What could the ammeter readings have been both before and after the increase?

Lesson Five: To order fractional reductions in volume in the context of glacial ice sheets.

There are two glacial sheets which have an identical volume of 16,500m3. Over the past decade, glacial sheet A has reduced in size by 3/5 whilst glacial sheet B has reduced in size by 2/3. Which glacial sheet has been reduced by the most?

There are three glacial sheets which have an identical volume of 18,000m3. Over the past decade, glacial sheet A has reduced in size by 3/4, glacial sheet B has reduced in size by 1/3 and glacial ice sheet C has reduced in size by 5/6.
Which glacial sheet has been reduced by the most?

The Southern Ocean has increased in volume over the past decade by 1 ¼. The Labrador Sea has increased in volume over the past decade by 1 2/5 and the Greenland Sea has increased in volume by 1 3/10. Order the fractional increases from smallest to largest.

Lesson Six: To analyse, using percentages, the financial implications of investing in renewable energy.

By installing solar panels, Fin is likely to save an average of 13% on his annual bill of £650. His friend Sam has also installed solar panels and is likely to save an average of 27% on his annual bill of £850. After the deductions, who will be paying the least for their energy?

Reducing a £450 energy bill by 16% results in a lower cost than reducing a £500 energy bill by 20%. True or false?

Two rival companies using wave energy are competing to secure a deal with the Coastguard. Currently, the Coastguard pays £3600 per year for their energy. Company A is promising a 30% reduction in the cost of energy whereas Company B is promising a saving of £900 per year. Which company is offering the cheapest deal?

A farmer has noticed that her energy bill last year was £4000 but since installing wind turbines on her farm, her energy bill is now £3000. How could this reduction be recorded as a percentage?