Northern Powergrid:

Calculating the Cost of Electricity

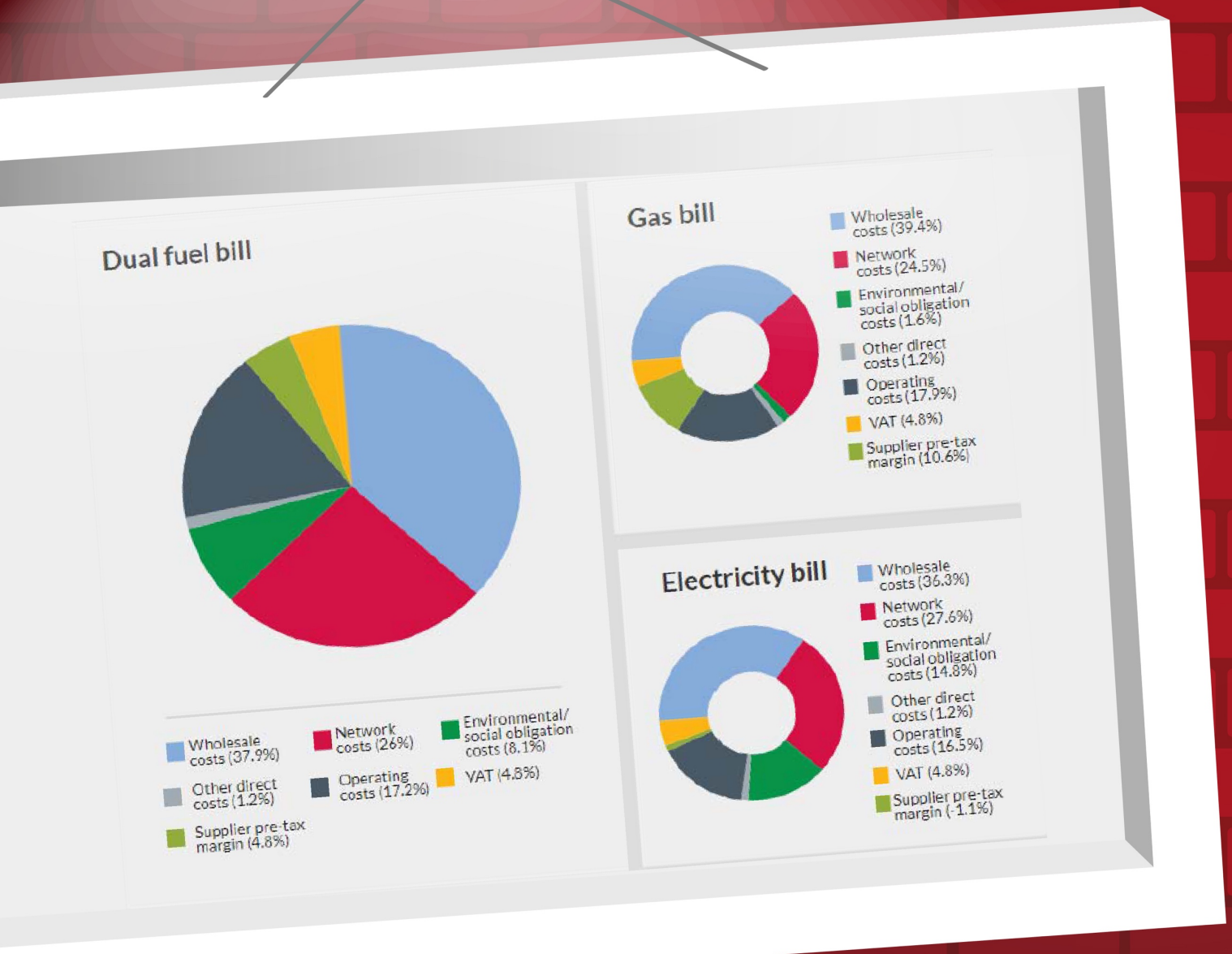
www.northernpowergrid.com/education

- How much do you think your parents/carers pay for your electricity and gas every year?
- The average cost in 2016 was £1,123.
- What goes into this cost? How do energy suppliers decide what to charge?

TEAM POWERGRID

NORTHERN POWERGRID

Breakdown of Your Bill.



Breakdown of Your Bill

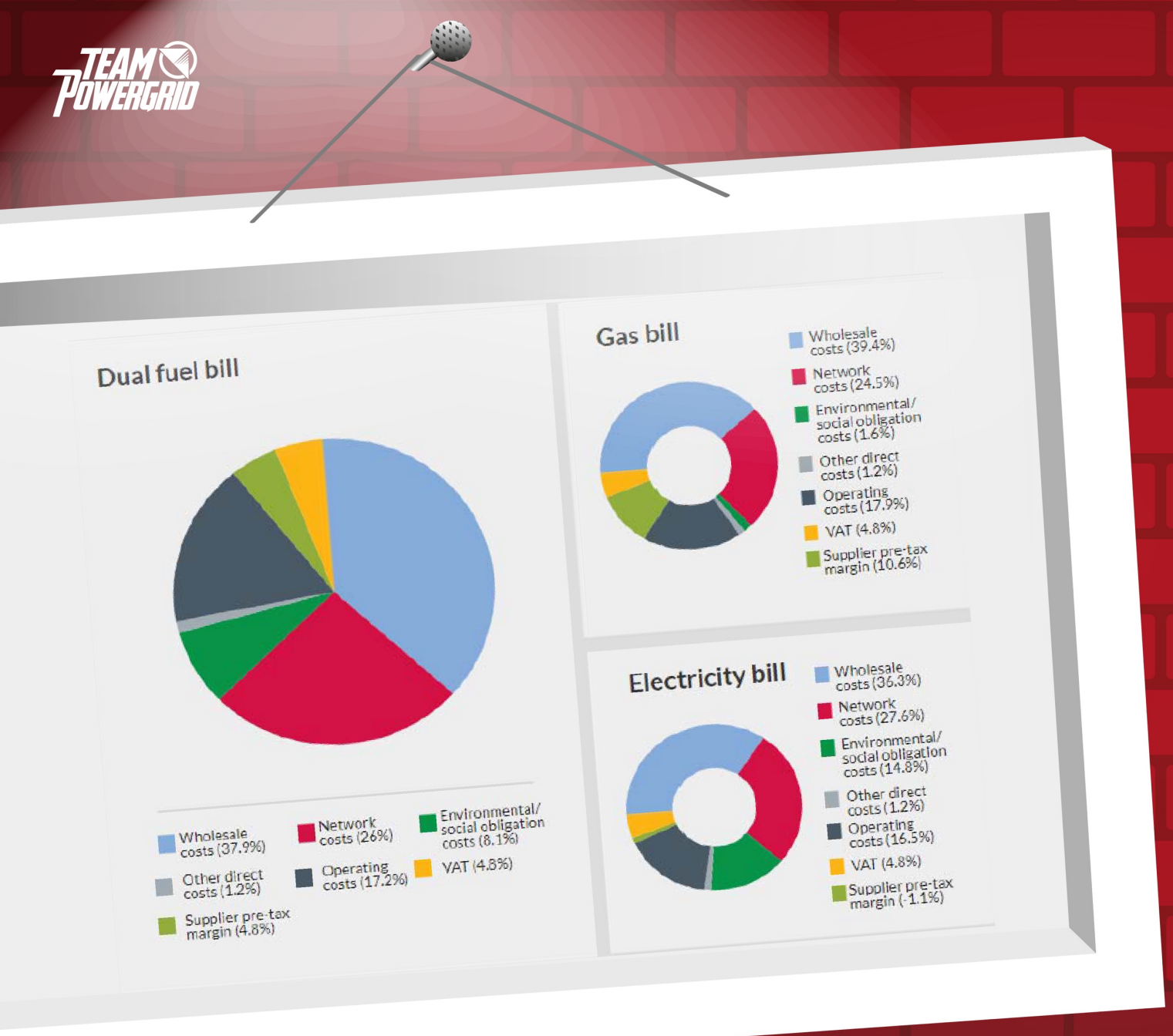
Energy Suppliers split their costs over the following factors:

37.9% Wholesale Costs

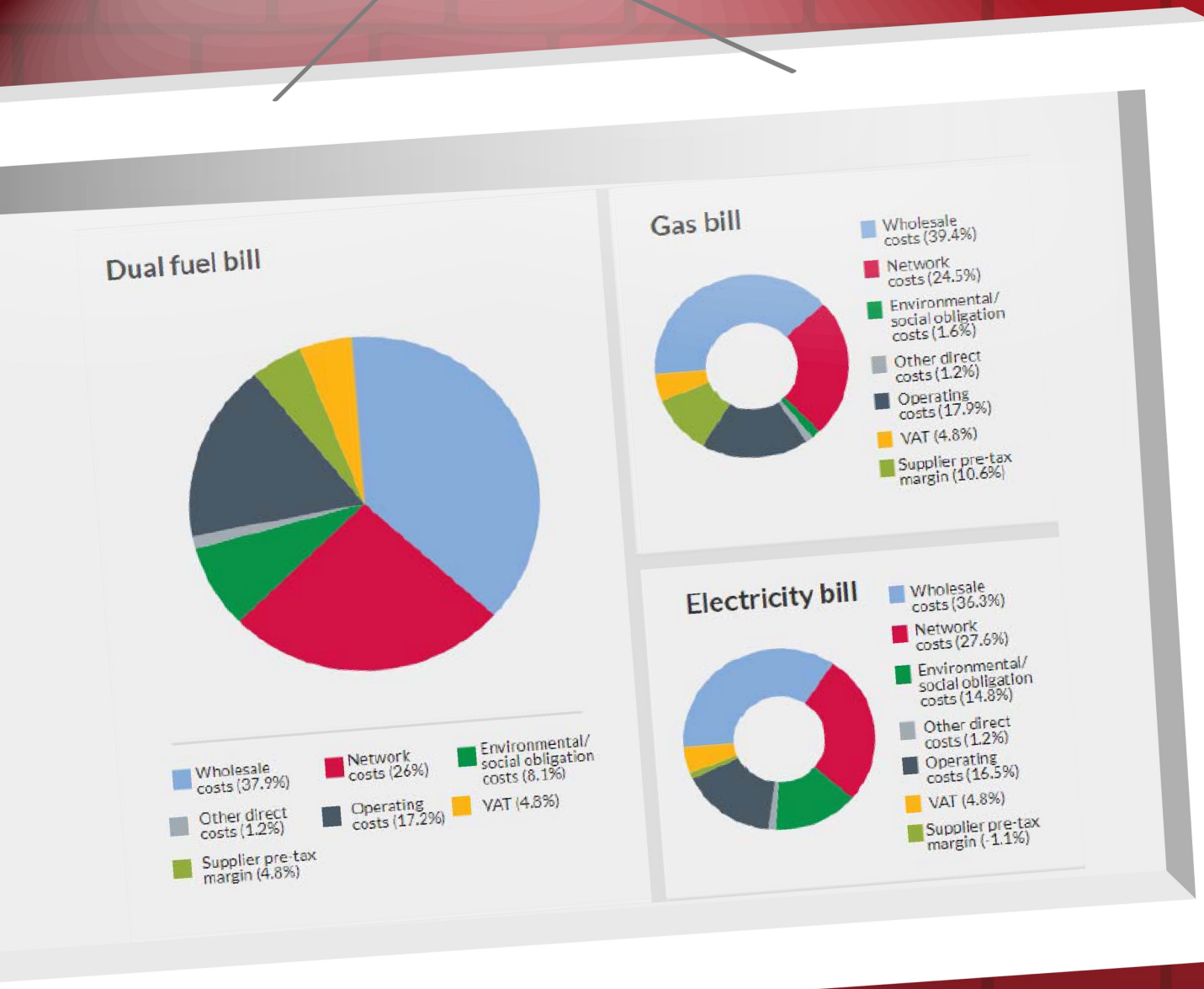
- The cost of buying energy from the Energy Market – heavily reliant on the cost of oil.

26% Network Costs

- The running cost of the electricity and gas distribution and transmission networks, including Northern Powergrid, who ensure the supply of energy continues to flow; along with charges from National Grid.



Breakdown of Your Bill



17.2% Operating Costs

- The costs incurred by the energy suppliers in running their day to day operations.

8.1% Environmental and Social Obligation

- Costs incurred in developing a greener, future proof network, such as low carbon energy, smart metering and green power generation.

4.8% Supplier pre-tax margin

- The profit that a supplier is allowed to make.

4.85% VAT.

How much does Northern Powergrid charge suppliers?

Year	Northern Powergrid Charges
2015/16	£81
2016/17	£87
2017/18	£82
2018/19	£80
Average	£82.50

- On average, Northern Powergrid charges energy suppliers £82.50 a year in distribution costs.
- The energy suppliers then pass on this charge to customers. Northern Powergrid charges make up around 10% of electricity bills.
- This means your parents and carers pay around £83 a year to have a reliable, safe supply of electricity which is available 24/7.

How do these charges compare to other services and products?

Northern Powergrid charges:

- £83/year, 23p/day.

Full Sky subscription:

- £978/year, £2.68/day.

iPhone 8 on contract:

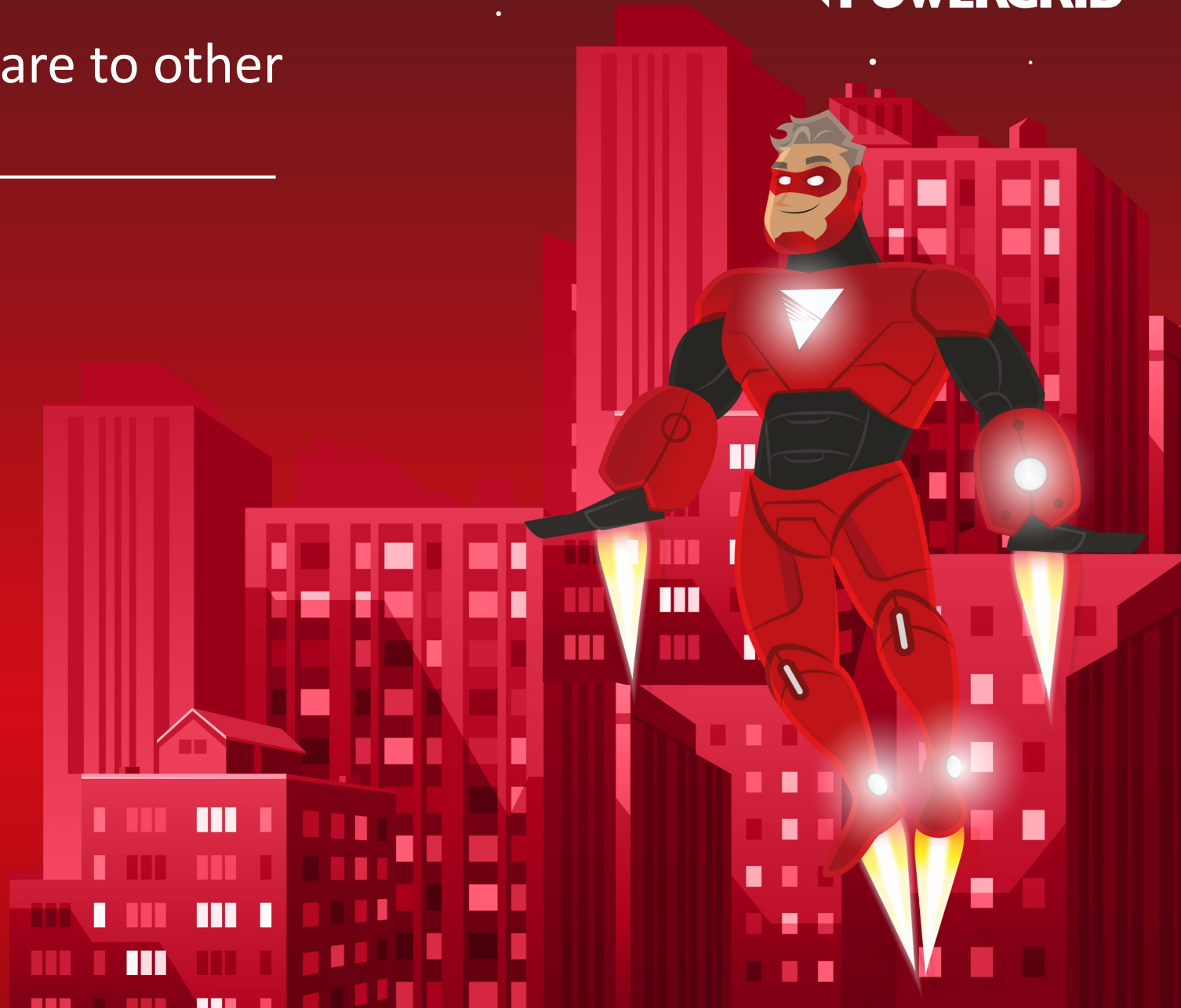
- £774/year, £2.12/day.

A Freddo bar a day:

- £91.25/year, 25p per day.

What would you rather spend 25p a day on?

- 1 Freddo bar per day.
- Or a reliable, consistent connection to the electricity grid, keeping the lights shining, your music blaring and your games console playing.



Dividing by 1000

We'll be using this calculation to convert Watts per hour into kWh, so let's practise!

Divide these numbers by 1000:

2.34	243.7	91835
0.4	9173	87.36

Divide these numbers by 1000:

2.34 ÷ 1000 = 0.00234	243.7 ÷ 1000 = 0.2437
0.4 ÷ 1000 = 0.0004	9173 ÷ 1000 = 9.173
87.36 ÷ 1000 = 0.08736	91835 ÷ 1000 = 91.835

Converting from Watts to kW:

- A washing machine uses 1200W per hour.
- If there are 1000W in 1kW, how can we work out 1200W in kW?

Converting from Watts to kW:

- A washing machine uses 1200W per hour.
- If there are 1000W in 1kW, how can we work out 1200W in kW?

1200 ÷ 1000 = 1.2

1.2 kW

This machine uses 1.2kW per hour

Converting from Watts to kW:

- If there are 1000W in 1kW, we divide by 1000, so 1200W is the same as 1.2kW
- A washing machine that uses 1200kW in and hour uses 1.2kWh of energy.

To work out the cost of running our washing machine for 1 hour, we need to multiply the kWh used (1.2 kWh) by the cost of 1kWh (15p)

1.2 x 15 = 18

18p

This machine costs 18p to run for an hour

So, if our washing machine uses 1.2kWh, and 1kWh costs 15p, how much will it cost to run this machine for 2 hours? Show your working.

1.2 x 15 = 18

18 x 2 = 36

36

This machine costs 36p to run for 2 hours

NORTHERN POWERGRID

A toaster uses 800w per hour.

This is 0.8 kwh

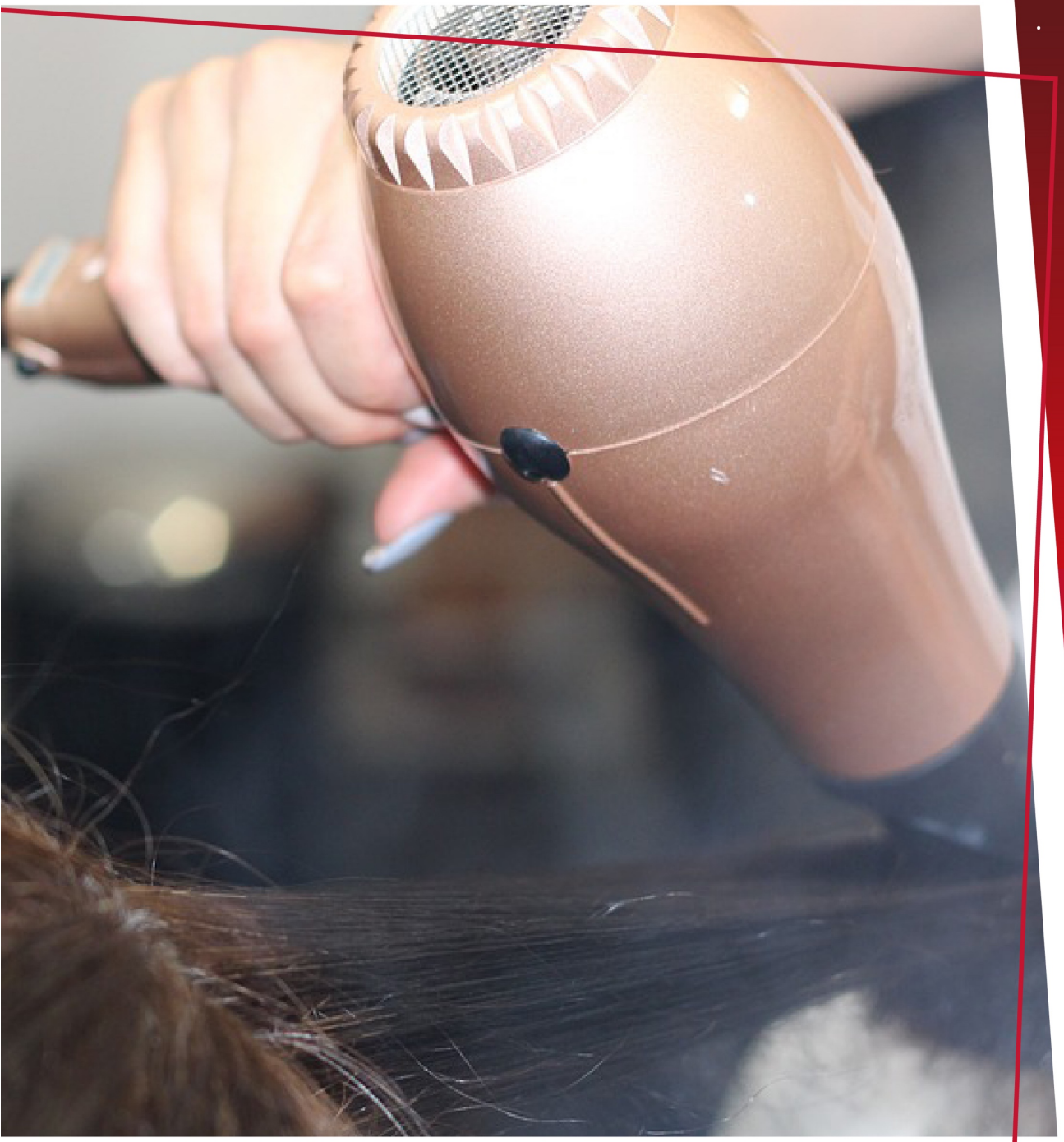
TEAM POWERGRID

Electricity costs 15p per kWh.

0.8 kwh x 15 = 12 p

This toaster is used for 30 minutes per day. How much does the toaster cost to use per day?

6p per day

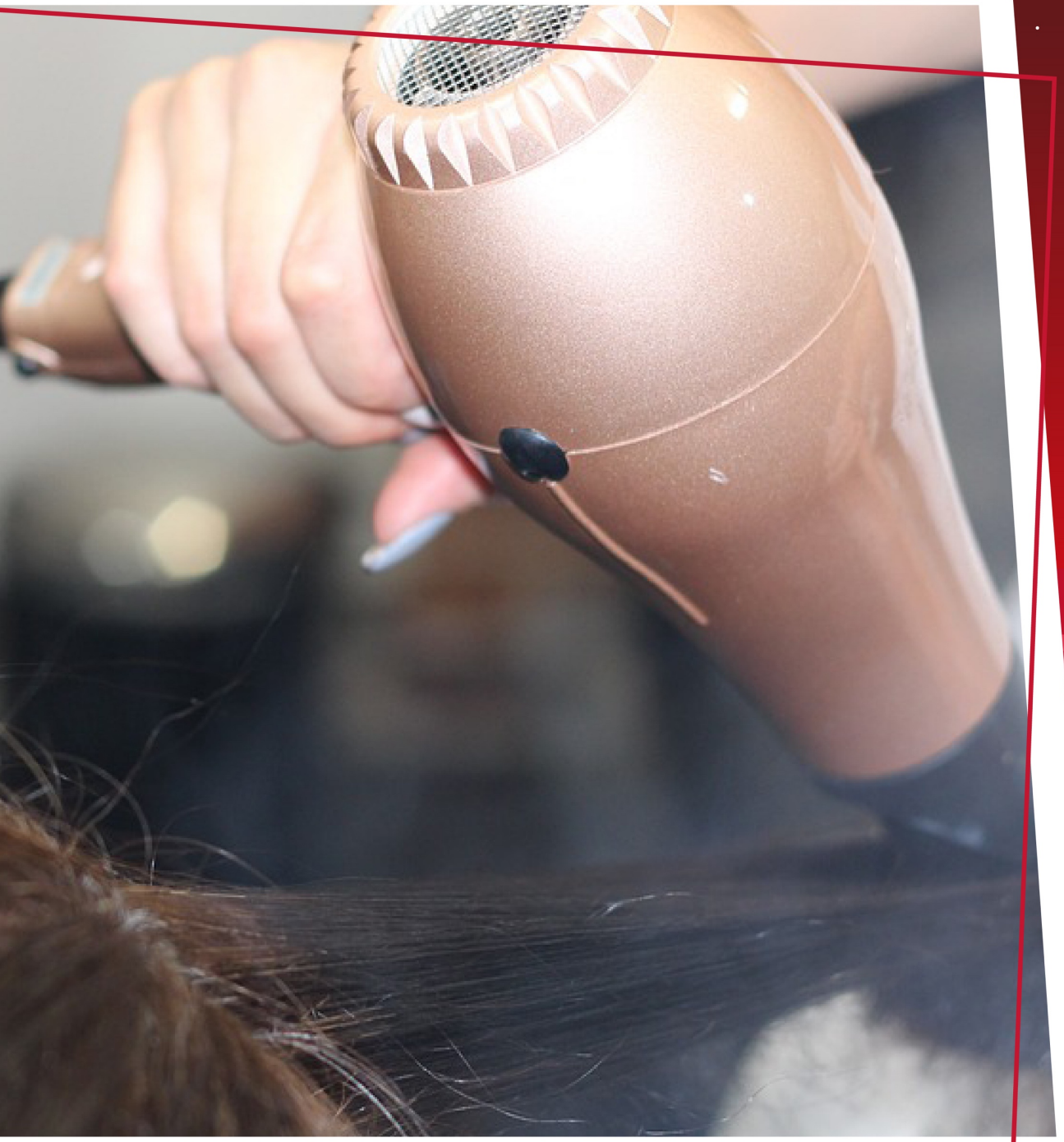


NORTHERN POWERGRID

"Over a week, I use my hairdryer for an hour in total.
My hairdryer uses 1800 watts per hour – that's 1.8kWh.
I'm charged 15p per kWh.
How much is my hairdryer costing me every week?"

27p per week

TEAM POWERGRID



Extension:

"I always use my hairdryer for the same length of time, 7 nights a week. How much is my hairdryer costing me per night?"

4p per night (rounded up)

NORTHERN POWERGRID

Let’s work out how much a fresh cup of coffee costs to make! Try the challenge!

TEAM POWERGRID

NORTHERN POWERGRID

"A coffee machine uses 0.8kWh of energy. At 15p per kWh, this costs 12p per hour."

TEAM POWERGRID

Hang on! It only takes me 5 minutes to make my morning coffee. How much does this cost?

There are 12 lots of 5 minutes in an hour, so:

$12 \div 12 = 1$

It costs me just 1p to make a fresh cup of coffee in the morning

Extension:

How much will it cost me to make a fresh cup of coffee every morning for a week?

7p

Item in the house	W used per hour
LED light bulb	7W
Clock radio	1W
Clothes dryer	2000W
Coffee maker	800W
Desktop computer	300W
Dishwasher	1200W
Electric kettle	1200W
Fridge/Freezer	200W
Games console	120W
Hairdryer	1800W
Home internet router	10W
Microwave	800W
Oven	2150W
Power shower	9000W
Smart phone charger	8W
Tablet computer	7W
Toaster	800W
Vacuum cleaner	400W
Washing machine	1200W
42inch colour TV	270W

Task:

You'll be given a table like this one. First, you'll need to convert watts per hour into kWh.

Task

1. Using your table of items found around the house, you are going to choose your top 7 “most frequently used” items and work out how much it costs to use them in a single day.
2. If there’s something missing from the list, you may be able to research the item and the amount of kWh it uses.
3. You’ll need to think about the items you have chosen and the length of time you use each one for, then you can calculate how much each item costs to use/ run.
4. Work this out using the price of 15p per kWh as your basis.

Remember

You will initially be working out cost per hour of usage. So, you will need to either multiply or divide your answers depending on whether use that item for more or less than an hour per day.

Extension

Paying for electricity monthly, as you use it, can cost 16.42p per kWh

Paying for electricity automatically by Direct Debit every month might cost 14.71p per kWh

Using your list of the items you use most, calculate the difference in price if you were paying for these by direct debit instead of monthly, as you use it.

Extension Hints

- For each item, you will need to know both the kWh and the estimated length of time per month that you use it.
- Once you've calculated the cost of paying monthly, as you use it **and** the cost of paying automatically by Direct Debit, you can then work out the difference in price by subtracting the highest total from the lowest total.

TEAM POWERGRID

NORTHERN POWERGRID

Using less energy is another way to save money. Northern Powergrid gives the following advice to help people save energy at home:

Move furniture away from radiators and heaters

Switch off lights when you are not using them

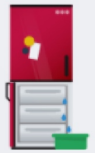
Draw curtains over windows at night

Turn electrical appliances like TVs and phone chargers off at the wall

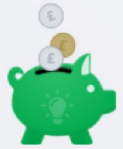
Turn down thermostat by 1°C and save 10% on your energy bills

Service heating systems at least once a year

Replace light bulbs with energy efficient ones



Defrost your freezer regularly



Shop around to make sure your energy supplier is the cheapest on the market

Plenary & Class Discussion

Whose “frequently used” household items use the most energy? How much have you estimated this will cost per day?

Which items do you think you could use less in order to reduce the cost of your energy consumption?

How will you do this? What habits and behaviours will you have to change and how will this impact on your daily routine? Do you know any techniques for saving energy?

Next Steps

Thinking about how much energy costs, how much can you reduce the amount of energy consumed (and money spent on electricity) in your household?

For homework, take another look at your list of frequently used items. How much could you reduce your use of each one? Work a revised estimate of how much you will use each item per day.

Using these new figures, work out how much money this will save your household each day, month, and year.

Challenge:

Research ways in which kettles and washing machines can be used more efficiently. What other household items can you find energy-saving advice for?

NORTHERN POWERGRID

Well Done!