Measuring cities' decarbonisation efforts

How on earth do you work out the carbon emissions of a city like Hull? David Shukman investigates.

David Shukman
Former Science Editor
BBC News

You can't very well have someone running around after every car to measure its exhaust, or visiting everyone's gas boiler to check what's being released. So a whole new science has been developed to try to get measurements that are accurate but also practical – and different systems have evolved worldwide.

In the UK, the standard approach begins with the government. It needs to know the total of the country's emissions, because we're part of a UN climate treaty that requires us to submit national figures every year. The UK's own legally binding target of reaching Net Zero by 2050, also means emissions have to be tracked.

So that's the national picture. To get a city view, you might think the easiest thing would be to divide up the national total between the different local authorities according to the number of people in them – but that takes no account of city-by-city variations.

So instead, the Department for Energy Security and Net Zero (DESNZ) gathers as much local information as it can: checking how much electricity and gas are sold in each area and monitoring the traffic to estimate emissions from transport.

It's a complex task which takes around two years to complete. So any carbon reduction we're experiencing today, in 2024, won't show up in the data until 2026.

This approach is what's called 'territorial' – calculating the greenhouse gases actually released within a local area.

Some cities like London want to include as much detail as possible, but that involves specialist consultants which aren't always affordable.

Others prefer a broadbrush view. Yes, the basic data is studied, but the main focus is on the three big sources – power, heat and fuel – and acting on them:

- **helping people save on electricity and heating by insulating homes and other buildings**
- **generating as much green power as possible with solar panels and heat pumps**
- **doing everything to encourage people to walk, cycle, use public transport or go electric**

Tackle these three and you're bound to see a fall in emissions in your area.

"It's the direction of travel that matters," according to Professor Anne Owens of the University of Leeds and an expert in tracking emissions.

"You don't need to know every gramme of carbon dioxide – you just need a baseline and go for it from there."

But what happens when people buy products that were made outside their city? Or indeed outside the UK?

At the moment, emissions are counted in the territory they're released in. If a car is made in, let's say, Germany, then the emissions generated during its production are counted there. After all, that's where the carbon dioxide and other gases entered the atmosphere.

So if someone in Hull buys that car, the emissions given off while manufacturing it aren't Hull's problem… unless you take a different approach.

You could say that it's fairer to count what are called 'consumption emissions' – those emissions associated not with making a product but with consuming it or owning it. In other words, you bought the car so the emissions that helped bring into existence are yours.

This matters on a global scale.

In recent years, a lot of manufacturing which used to happen in the UK and other Western countries, moved to China. The result is that our emissions went down and China's went up.

The Chinese say we need a system that better reflects who's really behind all these gases: producers like them or consumers like us?

Anne Owen
Associate Professor
University of Leeds

"It's the direction of travel that matters.

You don't need to know every gramme of carbon dioxide – you just need a baseline and go for it from there."

Measuring cities' decarbonisation efforts

How on earth do you work out the carbon emissions of a city like Hull? David Shukman investigates.

David Shukman
Former Science Editor
BBC News

Professor Anne Owens believes that looking at consumption emissions gives a clearer picture of what people's spending habits actually mean for the climate.

"Ideally, we'd measure everything because we want people to be aware of the emissions they're responsible for," she says.

And that raises yet another way of thinking about all this.

Manchester is working on emissions figures, not just for the city as a whole, but for each of its 32 wards. Ten of them have their carbon footprint assessments up and running already and the others will follow.

This 'hyper-local' scheme, called In Our Nature[4], is designed to make people feel closer to the process and its solutions, by showing them the progress that their own neighbourhoods are making.

It's a three-year project and it's about exploring how best to motivate people to take action and to support their efforts. The theory is that having this fine-grained data will help, and it seems to be working so far.

So it's an innovative time for counting carbon. The key thing – as Professor Anne Owens indicates – is that there's no right or wrong about the measurement options.

Ultimately, what's important is having enough knowledge to deliver the outcome that matters: pushing for green power, heat and transport as quickly as possible, so we all reap the benefits of going Net Zero.

CO_2e

Carbon Dioxide equivalent

Greenhouse gases contribute in varying degrees to global warming, depending on their heat absorptive capacity and their lifetime in the atmosphere. In order to standardise the global effects of these gases, the Intergovernmental Panel on Climate Change (IPCC) created the global warming potential (GWP) index, which describes the cumulative effect of these gases over a certain time frame (usually 100 years) compared to that of Carbon Dioxide (CO_2). The unit of measure for this standardisation is CO_2 equivalent (CO_2e).

1,120,080 tonnes
of greenhouse gas was created by Hull in 2021.

Hull's greenhouse gas emissions

Just over one million tonnes – that's the government's estimate for how much greenhouse gas was produced by Hull in 2021. The exact figure is 1,120,080 tonnes.

If that sounds a lot, bear in mind the UK total for that year: over 400 million tonnes. And for the world as a whole: 40 billion tonnes.

It's a measure of what's called CO2e or 'carbon dioxide equivalent' – a bundle of the most important planet-heating gases. The biggest is carbon dioxide. Two others, methane and nitrous oxide, are present in smaller quantities but are much more potent.

The calculation is done by the Department for Energy Security and Net Zero (DESNZ), and because it's such a monumental task it takes two years to crunch the numbers.

This means the latest stats are for 2021. We'll get the data for 2022 – the year that Oh Yes! Net Zero was launched – this summer.

Since 2005, when the process started, Hull's total has roughly halved so there's been a dramatic downward trend.

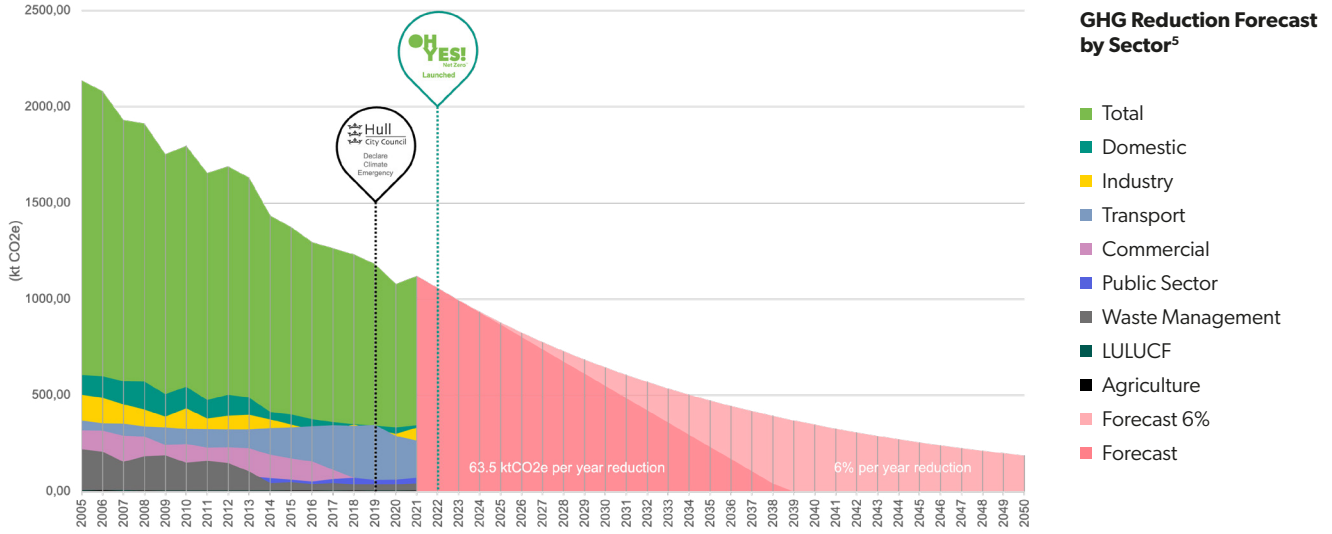
The sharp-eyed will spot a few jumps upwards on the graph, most recently between 2020 and 2021. That almost certainly reflects the bounce back in economic activity after the Covid lockdowns.

It's best not to worry too much about the figures year-by-year. For example, a big construction project attracting a lot of traffic could also cause a short-term rise. What matters more is how emissions are changing over a longer period.

If the average annual reduction continues, Hull will meet Net Zero – but possibly not until 2039.

Meeting the target sooner will take a big effort and will need a lot of support. But it should be achievable.

New green technologies have been falling in cost far faster than predicted and are forecast to become cheaper still. So solar panels, heat pumps and electric vehicles could be adopted much more rapidly than expected – one of many positive factors that could help Hull to reach net zero by 2050.



4 Our Carbon Footprints: Measuring Emissions Across Manchester| https://www.inournature.uk/our-carbon-footprints
5 UK local authority and regional greenhouse gas emissions national statistics, 2005 to 2021 | https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-national-statistics-2005-to-2021#full-publication-update-history