

Climate change

How we made the FT Climate Game



Working with scientists, modellers and policy experts, the crisis has been gamified to see if readers can cut emissions to net zero by 2050

Sam Joiner, Visual Stories Editor

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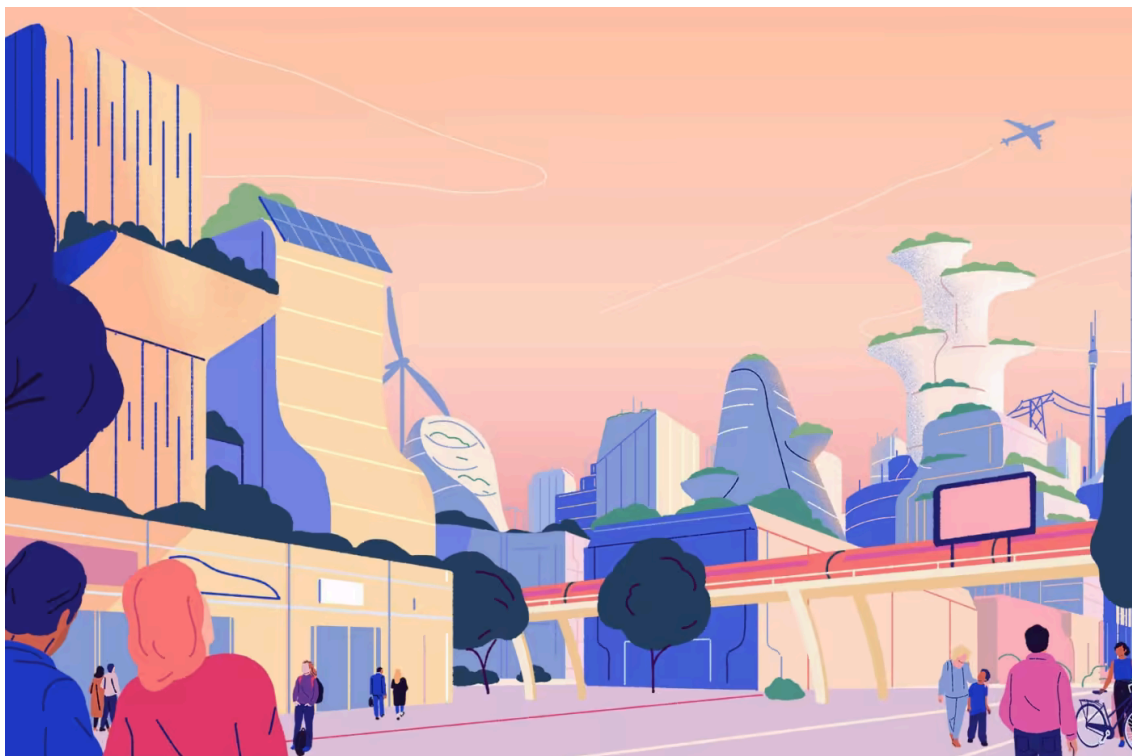
Reaching net zero greenhouse gas emissions by 2050 to keep the planet from further global warming seems a formidable task on an individual level. But what if you had the omnipotence to make all the necessary decisions?

Step forward the global minister for future generations, an international take on a [genuine role in Wales](#) and the protagonist in [the Financial Times' Climate Game](#).

The main goal is clear: cut energy-related carbon dioxide emissions from 36bn tonnes a year at present to net zero by 2050. Additional aims are to significantly reduce other greenhouse gases, led by methane, and to protect people, nature and jobs, all while ensuring the planet remains habitable.

The FT wanted to bring to life a process that can often seem abstract and dizzyingly complex. It requires changes in every sector of the economy, as well as in the way we live.

How we might gamify this challenge was not obvious. It would involve distilling hundreds of decisions into a manageable and comprehensible series of questions, while also calculating the effect these actions would have on reducing emissions.



The energy sector is the source of about [three-quarters of global greenhouse emissions](#) and holds the key to averting the worst effects of climate change, so that was a good place to start.

The International Energy Agency's [Net Zero By 2050 report](#), the world's first comprehensive study of how to shift to a clean energy system, provided the necessary framework.

This gave the game its structure, with 400 global actions directly focused on reducing emissions to near zero by 2050.

The questions in the game relate to the four sectors principally responsible for energy-related CO2 emissions — electricity, transport, buildings and industry — with answers having a direct impact on both emissions and global temperatures.

To successfully limit global warming to below 1.5C to avoid the worst effects of the rise in temperatures, the player needs to decide on the best course of action for each sector. The questions are mapped to the three pathways for cutting emissions used in the IEA's [World Energy Outlook 2021 report](#) — a scenario-based approach to forecasting future energy trends.

The [stated policies \(STEPS\) scenario](#) is based on existing national commitments for reducing CO2 emissions. On that basis, the [IEA calculates that emissions will keep rising](#), with temperatures projected to reach 2.6C by 2100.

The [announced pledges \(AP\)](#) targets promised by countries. This pathway falls well short of net zero — and the temperature

The [net zero \(NZE\) scenario](#) is an "achievable" pathway to a temperature stable and affordable energy supply. It involves ending the sale of conventional fossil fuels and replacing them with clean energy by 2040.

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A few "wrong" answers — mainly tied to failed ideas once trialled as solutions, such as [solar panels on roads](#) — were thrown in for good measure.

Each CO₂-related question in the game is tracked to one of these three pathways, creating a bespoke version of the [IEA's net zero chart](#) that is based on the choices made by the player and presented at the end of each round.

But a player's choices do more than just decide the trajectory within a sector, as Daniel Crow, one of the IEA climate and energy modellers who worked on the game, explains.

“Each player will generate their own unique emissions trajectory for all types of greenhouse gases. But it's not a railway track, where they're either on one branch or another. They jump between — and can explore the space between — pathways.”

“That's because the energy system is one entity”, Crow notes. “If you make the right choice in the electricity sector early on, it pays dividends in transport later in the game when you decide to ban internal combustion engine (ICE) vehicles in advanced economies. But if you make the wrong choice, you can go ahead and ban ICE vehicles, but you won't see the reductions coming through as a result.

“If you want to build enough high-speed rail to encourage a shift away from aviation, you need a lot of infrastructure. But unless you've decarbonised the industry sector, all that cement and steel to deliver the high-speed rail is going to have tonnes of emissions going with it. Everything has to move together.”

CO₂ might be the principal greenhouse gas contributing to global warming, but it was also necessary to include other significant pollutants.

Other experts and papers were consulted: leading scientists [Tim Lenton](#) and [Carlos Nobre](#), on the impact climate change is having on global earth systems; and climate change analysts [Nick Mabey](#) and [Mike Berners-Lee](#), on the steps and trade-offs required to get to net zero, among many others.

A section on methane, which accounts for about one-third of human-caused warming through emissions from gas leaks, landfills, old coal mines, and beef and dairy, was added. Land use was also included, given agriculture and deforestation contribute to a quarter of human-caused emissions.

Both were added to the climate model powering the game, with the answers having an impact commensurate with the net zero answers in our energy-related questions.

Emissions-cutting questions needed to be supplemented with those focused on other levers crucial to a successful net zero future, such as co-operation, innovation and adaptation.

Their impact is gauged using “effort points”, with 100 given to each player at the start. Every answer costs points — as do setbacks such as natural disasters — with players having to weigh up where and when they want to spend their effort.

Adding effort points served to emphasise the importance of taking action sooner rather than later. Answers cost more points as players progress, and by round three when 2050 is looming, things get prohibitively expensive if the wrong answers have been selected earlier in the game.

Investing in innovations and certain net zero answers can also earn back points. And, as Crow notes, reaching net zero in reality is very difficult without this upfront investment.

“The pathway to zero is one in which acting fast and hard really pays off in the long run. There are parts of the energy system which need innovation to happen now in order to deliver the new technologies we need at the scale and cost required,” he says.

And if you run out of points entirely? Even a global minister for future generations can be removed from office after one too many bad decisions.

Advisers were introduced to highlight other factors crucial to a net zero future: behavioural change, new technologies, green business practices and policy change. In game terms, all four advisers earn the player 10 points for working hard in their specialist area.

To reflect the fact that the carbon dioxide already in the atmosphere is changing the Earth dramatically, five “tipping points” were added. Based on real-world scenarios, these are critical thresholds that, once passed, potentially lead to irreversible changes to our planetary systems.

Players who pass a tipping point have to deal with the consequences (reflected in the automatic loss of effort points). The worse the job of cutting emissions, the more tipping points — a rudimentary but important way of showing the impact our decisions have on the planet.

At the end of the game, players see their total emissions cuts, how close they are to net zero and what changes to the planet have taken place during their time in office.

The game results also show what the Earth's median temperature is projected to be in 2100. This is calculated by the IEA using MAGICC v7+ — a reduced complexity climate model that accurately maps temperatures to the actions players have taken.

“This is state of the art climate modelling”, explains Crow. “Climate models tackle a branch of science in which there is inherently a large degree of uncertainty, but the game absolutely gives readers a realistic response to their actions.

“The model does many hundreds of runs through the pathways included in the game, mimicking the emissions going into the Earth's atmosphere from human and natural sources. The median temperature presented is the figure where 50 per cent of those runs lead to a result less than that temperature, and 50 per cent are higher.”

It means myriad results are possible in 2050. No more coal plants and electricity providing half your power? Sounds like you're on the way to a successful net zero future. Solar-panelled roads, painted white roofs and protein derived only from insects? Go for it, but the planet might not thank you.

We hope the satisfaction in [the game](#) will come from the sense of control over the final results, but also the puzzle of working out how things interact. There are numerous ways to affect the emissions model to amplify different outcomes, and this might tempt you to play it again.

Whatever world you end up with, it is worth cautioning that even players able to keep temperatures below 1.5C by 2100 will experience a bumpy ride.

“One of the paradoxical things about reducing emissions is that in the short term you can have a temperature rise which can actually be quite large”, says Crow.

“Out to 2030 or 2035, we're going to see very little difference in the temperature rise. It is only after the middle of the century that the temperature starts to come down.”

Illustrations by Johan Papin

Climate Capital

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