CARBON CITY ZERO

WORLD EDITION

Design Notes
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Carbon City Zero

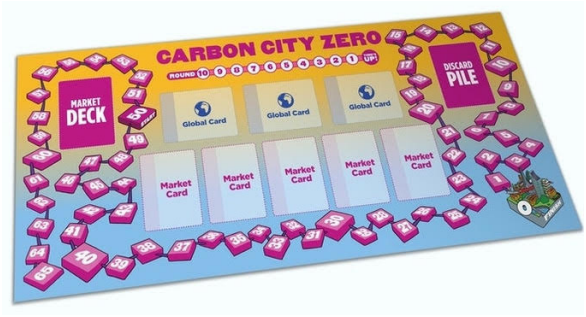
The goal of net-zero greenhouse gas emissions is expressed in the Paris Agreement (a legally binding international treaty on climate change within the United Nations Framework Convention on Climate Change) as a system that achieves a balance between anthropogenic (i.e. human-made) emissions by sources and removals by sinks (1).

In June 2019 the UK Government legally committed to reducing greenhouse gas emissions to net-zero by 2050. As a result, individuals, industry, and local and national governments will need to work together to bring about the largescale societal changes that such a target will require. However, the negative impacts of climate change from expert assessments do not align with those of non-experts, who perceive less of a threat, and are thus potentially less willing to take the drastic action that is needed (2). As such it is critical that the UK public is effectively engaged in revisiting these expectations, and in developing strategies that enable the rapid societal and behavioural transformations that will be necessary in order to achieve net-zero (3).

We wanted to create a game that enabled people to find out about the challenges and opportunities that were presented when trying to create a net-zero city. In doing so we felt that it was imperative that we talk to as many people as possible so that we could draw on their expertise and lived experiences in developing both the nomenclature and the mechanics of the game. We designed the game, but that design process was one of co-creation involving several hundred people who all fed into its development, from our initial conversations with policymakers, activists, and industry experts, to playtesting with community groups, students, and teachers.

Any tabletop game is likely to have to simplify the realities it tries to explore in the translation of those ideas to playable game mechanics. ***Carbon City Zero: World Edition*** (4) isn't a simulation game in any real sense.

Rather it sets out to promote conversations and show, in very broad brushstrokes, the kinds of dynamics that might be at play when trying to create a net-zero city. The design notes below are offered to give some insight into the kinds of dynamics we set out to model, and the kinds of discussions we hope these might prompt. The aim of these design notes is to present the underlying research that has informed the design choices made in the game, as well as enabling players to find out more about net-zero emissions and what achieving this would mean for both the UK and beyond. Like the city mayors in the game, we have a choice. Things are not too late for us to make a difference and to try and reach net-zero in order to mitigate the effects of global warming. But the time for us to make that change is certainly not without limit…



Set Up

When playing Carbon City Zero: World Edition, the player who has arrived at the venue using the most sustainable means of transport goes first. The purpose of this rule is to initiate a conversation into what constitutes sustainable travel. Even in car-dominated cities like Belfast (the UK's most car dependent city; with the average person in Northern Ireland making 81.5% of all their journeys by car compared to 63% in the UK), the promotion of alternative modes of transportation (through conversation) can have a significant effect on future commuting plans (5).

Collaborative or Competitive?

The first edition of ***Carbon City Zero*** (6) was purely competitive, with rival city majors racing for the glory of being the first to create a net-zero city. This was far and away the most controversial aspect of the game, and rightly so. Players got in touch to ask why we'd done this, and to point out the inherently collaborative nature of our response to climate change. We'd prompted a conversation that we hadn't anticipated but which we were delighted to hear. The second edition (i.e. Carbon City Zero: World Edition) includes both modes (competitive or collaborative) so now players are always faced with that discussion (discussions are important to us and offering players the chance to determine how the game works is one way to get them started). We know that the real world isn't always quite so collaborative and that such collaboration is often beset by shifts in economic power and issues of individualism (7). However, we have tried to factor in some of the difficulties that may lead to a breakdown in effective collaboration via the in-game Snags.

Round Tracker

The collaborative version of the game is played against the clock. Players win or lose depending on whether they manage to reach zero on the Carbon Tracker in time. This represents the real-world realities of climate change (we really do only have so much time) and the encoding of this time frame according to global measures such as the Paris Agreement, which aims to keep the increase in global average temperature to well below 2 °C above pre-industrial levels; and ideally to limit the increase to no more than 1.5 °C (8).

Sectors

The cards are arranged into three key 'sectors' (or 'suits'): Domestic, Industry, and Government. These broad and overlapping categories are intended to demonstrate the various stakeholders (all of whom we engaged with during the design process) whose interests both align and conflict with one another in creating net-zero cities.

Snags

In game terms, Snag Cards function by bloating your deck, slowing down the rate at which you cycle through your cards and making it more difficult to play powerful combinations. From a purely mechanical perspective, it is necessary to manage your deck carefully, and removing these snags quickly becomes important. The experience we are hoping to create for players a sense of the impossibility of controlling all factors (the cards are deliberately frustrating, and the style of the art is intended to promote this). They are also, we hope, fairly controversial and will generate discussion.

Global Cards

The game's Global Cards are perhaps the most powerful in the game and having them in play can make a huge difference to whether you win or lose. In the collaborative game they also work to encourage interaction between players. In this we were aiming to simulate the significance of global agreements/mandates in supporting action against climate change.

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Card Values and Powers

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Linking

In the game certain cards have special abilities that are activated when they are played in conjunction with other cards. In the rules we call these 'link abilities.' This game mechanic is intended to represent the ways in which certain groups, or certain technologies, become more effective when they work together. So, for example, Heat Pumps work to prevent the factory cards from increasing carbon, because we know that the recovery of heat is an essential step in reducing the carbon emissions of factories (9).

Materials and Packaging

A key aspect of the design (one of our self-imposed design constraints) was that it should only use recyclable material. As such, we decided not to use any plastics (players must find their own tokens) and to avoid cello-wrapping the box. Hopefully the need to find player tokens (we've seen some hilarious examples) will be a fun way to start conversations about the impact of board games on the environment (10).

Glossary

The game is accompanied by a glossary written by the team at Possible. We took this approach (rather than presenting information on the game cards) to allow the gameplay to focus on the representation of systems/dynamics and to leave the discussion of specific technologies to a post-game session. Indeed, research suggests that a debrief session following a game can be extremely useful in supporting game-based learning (11). We recommend that you read this Glossary alongside these Design Notes to get a thorough understanding of the 'real-world' function of all of the cards that appear in the game.

References

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11) Crookall, D., Serious games, debriefing, and simulation/gaming as a discipline. Simulation & gaming, 2010. 41(6): p. 898-920.

In the Classroom

Carbon City Zero: World Edition was designed to develop dialogues around developing net-zero cities with a wide audience in mind. Aside from being in the curricula of many high school students (aged 11-18) across the globe, we believe that it is vital for these citizens to be presented with opportunities to discuss these issues now; after all it is the current and future generations that will be faced with the greatest challenge of how to mitigate and adapt to the consequences of global warming. The notes provided in this section are suggestions for using Carbon City Zero: World Edition in the classroom.

Running the Game

As university academics with experience of teaching in high schools, we appreciate that every classroom environment is different. However, we offer the following advice and guidance based on our own teaching sessions using Carbon City Zero: World Edition.

Space: The ideal setup for the game is a series of tables, each of which needs to be a minimum of 1.5 m x 1 m, and which can accommodate between 3 and 8 players.

Setup: If possible, we recommend setting up Carbon City Zero: World Edition prior to the teaching session, and if you have them, the optional boards can be extremely useful in facilitating gameplay. If the students have not played the game before we suggest asking them to a watch a video of how it is played, either in their own time or in a previous lesson.

Time: The ideal time for this session is 2 hours. 30 minutes of setup and initial discussion; 60 minutes of playing the game; 30 minutes of post-game discussion. It can be done in less time than this, especially if the students have previous experience of the game, but do not skimp on the post-game discussion, as this is vital in order to help establish a meaningful dialogue (see below).

Facilitators: We recommend one teacher / facilitator per three active games of Carbon City Zero: World Edition.

Double-up: In order to accommodate larger classes, we recommend asking students to play in pairs. This is especially effective if few of the students have played Carbon City Zero: World Edition before, and it can also help to develop further dialogue in the downtime between player turns.

Audience: Whilst Carbon City Zero: World Edition has been run successfully for students from age 11 upwards, the space and facilitator requirements mean that it is ideally suited for the slightly smaller classes that are associated with older high school students and seminar classes at universities and in higher education.

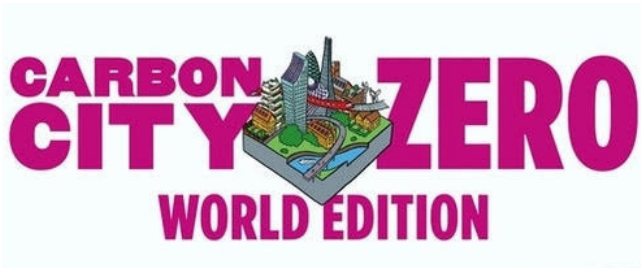
Alternative modes

If you're short of time, or are working with a younger audience, consider the following alternate play modes:

SNAP! (2+ players) : With two sets of the game, it is easy to create a deck of cards with which to play snap. All you need are 13 sets of four identical cards and you're ready to play.

CHASE THE CARBON [AKA Chase the Ace!] (3+ players): Use two sets of the cards to create a deck with 12 sets of four identical (non-Snag) cards and add in a single Snag Card of your choice. We recommend 'Public Apathy.' Shuffle the cards and deal them face down amongst the players. Players then discard any pairs from their hands. The player to the left of the dealer begins play, choosing one card (without looking at it) from the dealer's hand. If the card now makes a matching pair this pair is now discarded. The next player to the left now selects a card from the first player. Play continues clockwise in this fashion. Players are 'out' when they discard all of their cards. The last card left will be the Snag Card, and the player holding it at the end is the loser.

MASSIVE CARD RESEARCH GAME : This one's not really a game. Give each team of players a single card (printed to whatever size your printer allows, the bigger the better). Ask them to research the subject that is represented on the card and to prepare a short 'poster presentation' for the rest of the class.



Developing a Dialogue

Here are some pre-game and post-game questions that we have used to seed dialogue amongst students:

Pre-game:

1. What do you understand by the phrase net-zero?
2. Is global warming something that concerns you?
3. Do you play any tabletop games?
4. Would you rather play a collaborative or a competitive game? Why?

Post-game:

1. If playing the collaborative game, did you win or lose?
2. What did this game make you think about the challenges of building a net-zero city?
3. What were some of the strategies for doing well in the game? Could these be replicated in the real-world.
4. How would you improve the game?

Further Reading

One of the difficulties that non-scientists face in developing dialogue around decarbonisation is in finding reliable information. The following sources (as well as the footnotes contained within these design notes) might provide a good starting point for those interested in finding out more:

1. The Executive Summary of 'Reducing UK emissions: 2020 Progress Report to Parliament' from the Committee on Climate Change: https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/ The Executive Summary (~10 pages) of this report provides a fantastic overview of the current situation of the UK's attempts to reach net zero, why this is important, and the challenges that we face in doing so.
2. 'UK net zero target' from the Institute for Government: https://www.instituteforgovernment.org.uk/explainers/net-zero-target This document from one of the UK's leading think tanks provides a concise account of the what net zero means in terms of government legislature, and what the UK has legally committed to.
3. 'Net Zero in the UK' from the House of Commons Library: https://commonslibrary.parliament.uk/research-briefings/cbp-8590/ This Library briefing provides an explanation of the introduction of the UK's net zero by 2050 legislative target.

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Get in Touch

If you have any questions about Carbon City Zero: World Edition, or any suggestions for how to improve it, please get in touch by emailing us at:

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