Playful Explorations: Non-domestic energy research through games design

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Abstract

Games design lets us explore systems with audiences helping imagine different possible futures. As part of the NetZeroInsights (Net0i) project we have been exploring a range of creative methods and activities that create space for exploring and communicating systems complexity to help us imagine different ways of designing ICT interventions to support energy reduction. This demo showcases three games that explore of playful and speculative alternatives for non-domestic energy interventions.

Keywords

Games Design, Energy perspectives, Storytelling, Digital Interventions, Non-domestic energy, Net Zero,

1. Introduction

Non-domestic buildings used by industrial, commercial and public sectors contribute significant amounts to global greenhouse gas emissions, made complex by the varying complexity in organisation systems and energy demand patterns. Such organisations, often through commercial landlords and outsourced digital services, have access to growing swathes of time-series data through building and energy management systems. NetZeroInsights (Net0i)[1] looks to design impactful ICT-enabled interventions for these audiences, through developing novel tools and analyses that combine this time-series data with new data science tools, and interfaces that harness deep systems and organisational knowledge.

In this project we've been looking at different ways of making system knowledge (e.g., organisational context) visible and usable in energy reduction tools and analyses. We have developed data ontologies to facilitate improved data maturity and the capture of organisation specific knowledge [1], analysed the pitfalls of legacy ICT and building management control for non-domestic energy demand reduction [2], and created fictional designs of energy dashboards and speculative digital interventions to explore alternative approaches enriched with systems knowledge [3]. Through this work, we have found that normative practice shaped by education and training, data-driven tools, and established mental models around data and energy demand reduction serves as a limiting factor to imagining more broad and radical possible (and sometimes implausible) approaches for energy demand reduction (cf. [4]).

Our demo compliments established creative approaches of communication and systems exploration, such as the physical games [5], DIY methods[6], card decks for ICT design [7], and speculative design [8, 3]. We focus on the medium of games as they "allow players to consider the societal impacts of alternative presents and plausible futures" [9]. The prototypes we propose in this demonstration are playful speculative didactic prototypes [10, 11]. We use games design practice as an approach to generate knowledge through designing, hacking, and exploring games that model and make visible the complexity of systems [12, 13]. Through our games we are able explore the interplay between real world organisational, ICT and energy systems, surfacing and critique the often unseen and misunderstood [13]. At the conference we will presents three games: *Energy Divination* about non normative energy and ICT narratives; *Optimise!* - demonstrating the value of systems knowledge; and, *NotZero* - a stakeholder perspectives, complex systems, and participatory decision making RPG.

ICT4S 2025 - Demos and Posters, Dublin, Ireland

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2. Energy Divination: *Would you like to tell the future of energy?*

Energy Divination is a self-guided experience, For those unable to Divine energy futures our Reader will show you the future.

Through this game we explore the use of visual prompts as an alternative way of showing information and telling stories about energy systems and energy futures. We take inspiration from two areas: 1) historical approaches like Tarot and Divination that enable reflection and story telling about possible futures through the medium of supernatural agencies, and 2) visual story telling games like Dixit or Mysterium which use only visual prompts to get players to tell stories and solve murders.

Building on our speculative design *ContextSense*, a headset that connects Energy Managers to signals that are not perceivable to humans [3], this activity brings practical and gameful elements to the concept of exploring different approaches for visual communication and telling energy stories. The intention behind this design is to play with the normative ways in which data is presented and used to forecast or predict systems behaviours through different kinds of story telling.

Figure 1: Energy Divination is a quick visual prompt game about using only visual information to predict (or forecast) energy futures. It encourages an alternative approach and perspective to the data-centric thinking that happens in energy research and ICT interventions.

3. Optimise! *Turn the dial and learn about the system on the job.*

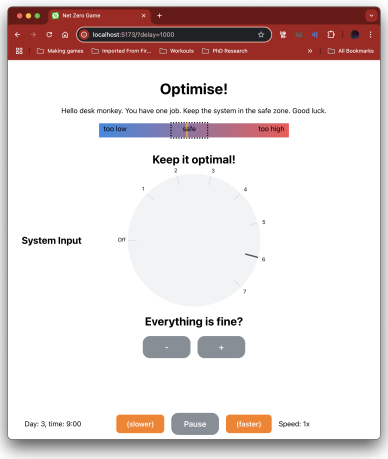

Figure 2: Optimise! is a short digital game that helps players peak at the complexity behind the dial.

We're interested in exploring the affordances and mental models of systems through playing with mundane and normal interfaces that exist in workplaces, like the humble thermostat control (cf. [4]). Through the short gameplay loop of Optimise! the norms and affordances of the thermostat will warp and change, revealing what goes on beyond the dial.

Optimise as a game design seeks to incrementally explore the complexity of optimising (Energy) systems through gameplay. We were inspired by idler games like Universal Paperclips, Cookie Clicker and The Idler Class, and the ways that these games start with very simple and mundane mechanics, that get incrementally more complicated as playtime increases, often to the point of overwhelm and absurdity where players ignore the earlier parts of the system, focusing on optimal ways to increase production or profit.

4. NotZero: *Learn from historical Net Zero actions as a Climate Anthropologist*

NotZero is inspired by storytelling games like Fiasco, and is a hack of Solarpunk futures. We designed this game to build worlds and tell stories that encourage reflection on how people who currently have limited agency in hierarchical and bureaucratic organisations could help (or hinder) organisations as they increasingly use ICT and data to reduce energy consumption and carbon emissions. It also helps us think about the different impacts that Net Zero policy or ICT intervention might have on different people within an organisation.

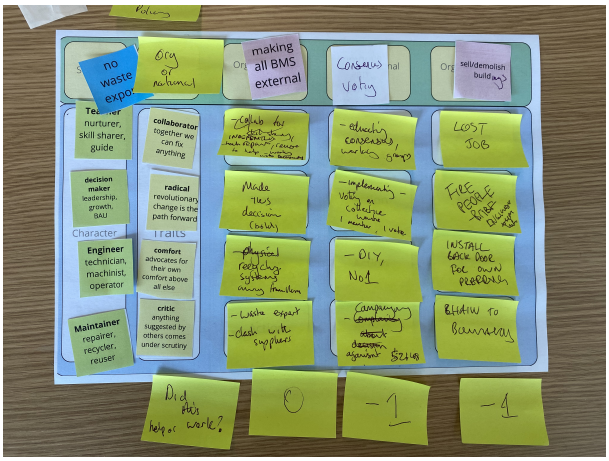

Figure 3: NotZero is a rules-light story-creation game where players uncover how businesses used ICTs and other means to enact or resist organisational energy and carbon reduction policies.

You play as Climate Anthropologists from the future researching how organisations responded to net zero policies. Cards are turned over to describe polices that an organisation responded to, as well as the characters who were involved in these responses. Through the three phases of the game, players describe how the characters would respond to an event and document this on the board. Through the game, the players build on the prompts and responses in each phase to tell a story of what happened to this organisation and how it used ICT when it responded to a climate change policy or event.

Throughout Net0i we've observed that very few stakeholder groups are actively involved in energy demand reduction; that the influences of organisation policy change are often opaque; digital interventions are often detached from the experiences of building users; and, there's a lack of shared perspectives between stakeholders i.e. energy managers aren't actively thinking about office workers, and vice versa. The game looks to draw attention to how people within an organisation have interest, power, and agency to help with energy challenges and interventions. We wanted to explore what dynamics might arise if different kinds of stakeholders were involved in energy system decision making, whilst also increasing the awareness to players that different people (and their perspectives) are valuable in intervention design and energy system futures. Our hope that, through the storytelling gameplay, players get to imagine other people's perspectives and the rich variety of people's roles, experiences and ideas can help organisations deal with climate crises, codesign impactful ICT interventions, and respond to energy policy.

5. Statement for Demonstration

The versions of the games present in this paper does not represent the final versions. These games are all artefacts of Research through Design, and are therefore works-in-progress, evolving and maturing as they continue to be developed through our on-going research. If accepted this demonstration will be presented at UCD and we will require poster boards, tables, and chairs to host these demonstrations.

Acknowledgments

We thank our funder, EPSRC (Grant ref. EP/T025964/1), participants of our research, and all those people who support us when we are exploring new and unconventional approaches.

Ludography

- Dixit (2008) - Match visual prompts to titles suggested by the storyteller, and guess which card the storyteller selected to win points.
- Mysterium (2015) - A collaborative murder mystery game powered by visual clues from the spirit that haunts the house where the murder happened.
- Universal Paperclips (2017) - An idler game about building a paperclip manufacturing empire.
- Cookie Clicker (2013) - An idler game about creating cookies, exploring hypercapitalism, accelerationism, and the occult. Ascend to explore new mechanics and boost cookie production.
- The Idle Class (2018) - "An Incremental Descent into the Nightmare of Capitalism" in your browse. Interns are disposable. All that matters is ROI and Growth.
- Fiasco (2012) - Tell stories about ordinary people and decide their fate. "Lives and reputations will be lost, painful wisdom will be gained, and if you are really lucky, you just might end up back where you started."
- Solarpunk Futures (2022) - A short collaborative story telling game where players respond to prompts to document the actions of ancestors in search of a Solarpunk Future.

References

[1] C. Remy, A. Tyler, P. Smith, O. Bates, A. Friday, Wasted energy? illuminating energy data with ontologies, IEEE Pervasive Computing (2024).

[2] A. Tyler, O. Bates, C. Remy, A. Friday, Mind the gap! the role of ict in office heating & comfort, in: 2024 10th International Conference on ICT for Sustainability (ICT4S), IEEE, 2024, pp. 215–226.

[3] O. Bates, C. Remy, K. Cutting, A. Tyler, A. Friday, Exploring post-neoliberal futures for managing commercial heating and cooling through speculative praxis, in: "LIMITS 24", 2024. URL: https://computingwithinlimits.org/2024/, "LIMITS 2024: Tenth Workshop on Computing within Limits ; Conference date: 18-06-2024 Through 19-06-2024".

[4] C. Bremer, When mental models grow (c) old: A cognitive perspective on home heating automation, IEEE Pervasive Computing 19 (2020) 48–52.

[5] P. Karadechev, R. H. Jensen, V. V. Jensen, H. A. Haxvig, M. Teli, M. Löchtefeld, Pluricards: Engaging with the pluriverse to explore new sustainability research directions, in: 2024 10th International Conference on ICT for Sustainability (ICT4S), IEEE, 2024, pp. 262–271.

[6] A. Biørn-Hansen, O. Bates, Liminal excavations: A zine that explores alternative visions, ideas and critiques on the topic of sustainability and ict, 2024.

[7] L. Bornes, M. T. Smith, O. Bates, G. Blair, C. Letondal, R. Vingerhoeds, Rebound archetypes: A card-based tool to help designers think through the rebound effects when designing for sustainability, in: Relating Systems thinking and Design, 2024.

[8] B. Penzenstadler, B. Tomlinson, E. Baumer, M. Pufal, A. Raturi, D. Richardson, B. Cakici, R. Chitchyan, G. Da Costa, L. Dombrowski, et al., Ict4s 2029: What will be the systems supporting sustainability in 15 years, in: 2nd International Conference on ICT for Sustainability (ICT4S 2014), 2014, pp. 30–39.

[9] P. Coulton, D. Burnett, A. Gradinar, Games as speculative design: allowing players to consider alternate presents and plausible features (2016).

[10] A. Dunne, F. Raby, Speculative Everything, With a new preface by the authors: Design, Fiction, and Social Dreaming, MIT press, 2024.

[11] A. Calleo, Playful prototyping in speculative design practices (2024).

[12] A. Hook, P. Coulton, Games design research through game design practice, in: Game Design Research: An Introduction to Theory and Practice, ETC Press, 2017, p. 97.

[13] A. Holland, Cardboard Ghosts: Using Physical Games to Model and Critique Systems, CRC Press, 2025.