Efficiency Technology as a Political Act

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Regarding technology simply as tools, products or devices can fail to capture that it has a political dimension too. Especially in areas like sustainability that are highly political themselves, it can be tempting to frame technology as politically neutral. Drawing on my background and research in Sustainable HCI (SHCI) in general and energy systems in particular, I focus on efficiency technology, i.e. technology that is designed to promote energy efficiency, to argue that it would be a misconception to classify it as apolitical. Rather, I suggest that efficiency technology is also a political act, an unspoken articulation to continue 'business as usual'—in a way that doesn't invite discussion; unless it's helping people to live under specified constraints like carbon taxes or extraction caps.

1 INTRODUCTION

With its global consequences evermore present, climate change can be seen as of one of the most significant problems of our time. Trying to limit the consequences, which include e.g. extreme weather phenomena [17] and sea-level rise [11], people across domains and areas of expertise are investing time and effort to develop mitigation strategies. As climate change is caused by an increased concentration of greenhouse gases in the Earth's atmosphere [12], the key to successful mitigation will likely be a significant reduction of greenhouse gas emissions. The problem: most greenhouse gas emissions stem from fossil fuels, which are used to derive the energy we need to sustain our current way of life. A common approach to reduce emissions without requiring significant system or lifestyle adjustments is the introduction of efficiency technology, i.e. technology that is designed to promote energy efficiency. Based on the idea that systems or devices are able to complete specific tasks with less energy [13], efficiency projects can take on many forms, ranging from the installations of energy-saving light bulbs to fully automated buildings. Often well-intended, I want to highlight that the focus on efficiency projects can be problematic because it implies that we can continue 'business as usual'. Rather, efficiency technology, should be seen as a political act, an unspoken articulation that nothing fundamental needs to change and a barrier to discussions that question our ability to effectively mitigate climate change within the current system.

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2   EFFICIENCY TECHNOLOGY REINFORCING BUSINESS AS USUAL

The idea that technology has a political dimension and can, thus, act as a lens for our perception of the world is already well established. In 2010, for example, Dourish [3] offered a profound reflection on the relationship between sustainability and HCI, and with it on the intertwining of design and politics: "*Political, social, cultural, economic, and historical contexts have critical roles to play, not only because they shape our experience with information technologies, but also, and even more, because information technologies in contemporary life are sites at which these contexts are themselves developing*". Technology use is contextually embedded, and while it can be easy to get carried away with excitement about new technological innovations, it is important to understand the significant impact they can have. Highlighting the uniquely powerful position this creates for technology specialists, our community has been urged to focus on ecological limits [14] and on "*the social and ecological benefits, risks, and consequences of real sociotechnical-ecological practices, not on novel technologies per se*" [15].

In the case of efficiency technology, a risk is the underlying expectation that it solves the problem for which it is intended. Both decision-makers who introduce the technology and individuals living and working in spaces shaped by it can easily gain the impression that it takes away some of their own responsibility. In the case of climate change mitigation, this might translate to: if algorithms are taking care of emission reductions, why would we need to? This isn't to say that efficiency technology can't make positive contributions by identifying and reducing energy wastage. But if we look at emission trends and statistics, we do not seem to be on a promising trajectory [19], indicating that until now efficiency technology has not been sufficient. Issues that limit its energy reduction potential include but are not limited to the energy requirements of the technology itself, including both embodied and operational aspects (e.g. [1, 9]), and rebound effects, which describe a range of mechanisms that counteract efficiency gains [5]; the latter having been reported for over 150 years [6]. Yet by continuously relying on energy efficiency, we are reinforcing the belief that it can be relied upon.

In this sense, efficiency technology is fuelling technological optimism. Identified as one of twelve discourses of climate delay—which are discourses that acknowledge climate change, but justify inaction or inadequate efforts—technological optimism presents itself as, "*we should focus our efforts on current and future technologies, which will unlock great possibilities for addressing climate change*" [10]. As technology that is yet to create a turning point in our climate change mitigation efforts, efficiency technology is unwarrantedly reassuring us, delaying our action further.

3   EFFICIENCY TECHNOLOGY SUPPORTING CONSTRAINTS

Aware of the urgency of the situation and slow progress towards emission targets, many scholars, in HCI and beyond, have emphasised the need for more systematic changes to combat climate change. A well-known voice among them is Naomi Klein. In her book *This Changes Everything: Capitalism vs The Climate* she argues, "*What the climate needs to avoid collapse is a contraction of humanity's use of resources; what our economic model demands to avoid collapse is unfettered expansion. Only one of these sets of rules can be changed, and it's not the laws of nature*" [7], as quoted in [8]. As established in my recent research [2], Sustainable HCI (SHCI) researchers have identified the support of activism and system change as a valuable contribution of the field (e.g. [4, 16]). Whether system change would ultimately bring the desired outcomes cannot be guaranteed, but it might be the best option we currently have if we want to avoid collapse [18]—an option that is brought out of focus by the presence of technological 'solutions' like efficiency technology.

Notably, there are contexts in which I would argue that efficiency technology can help make a difference without hindering system change: contexts with emission or resource constraints. Such constraints include but are not limited to extraction caps, emissions taxes and limits on consumption, and their introduction inherently changes the system in which we operate: priorities and boundaries shift. In such contexts, efficiency technology can make helpful contributions without giving undue reassurance.

In line with this reasoning, me and my PhD supervisors have proposed a new pathway for the SHCI community called *Green Policy Informatics*. Focusing on climate change mitigation, the idea behind *Green Policy Informatics* is that the SHCI community could effectively apply a more traditional design and usability skillset in contexts in which policy makers have introduced constraints. This includes the development and improvement of efficiency solutions, which can help to 'stay within budget'. Given that hidden and embodied energy costs are carefully evaluated, they can become tools to support an improved system, rather than to indirectly advocate for 'techno-fixes' in an inherently unsustainable environment.

4 CONCLUSION

Efficiency technology is not politically neutral. It is a political act, an affirmation that nothing fundamental needs to change. In this position paper, I have outlined why the reliance on efficiency technology for climate change mitigation is problematic, and how it shapes our understanding of sustainability and responsibility.

In the context of material ethics in computing, this position paper discusses technology that aims to optimise the use of material, as well as technology that aims to address a broader than technological problem. More specifically, the position paper speaks to the disparate impact and visions of digital technology in energy transitions. An accurate understanding of the potential and challenges associated with different kinds of digital technologies, including those that aim to drive efficiency, is critical to advance towards net zero. The public needs to take note that they cannot rely on technologists to mitigate climate change, and that their efforts are needed to put pressure on policy makers to pass ambitious climate policies.

I want to highlight again that it is the *current* system that makes efficiency technology counterproductive, because it evokes a false sense of progress and hinders conversations about more effective strategies. Outside of the current system, efficiency technology could make valuable contributions to sustainability. We need policy makers to enable this by creating environments in which efficiency technology supports resource and emission goals, not 'business as usual'. To do so, we need to raise awareness for the political dimension of technology and challenge technological solutionism in favour of (open conversations about) more systemic solutions.

BIOGRAPHY

Christina Bremer is a PhD student in the Socio-Digital Sustainability group at Lancaster University. Funded by the Leverhulme Trust Doctoral Training Programme in Material Social Futures, she is keen to apply her knowledge of cognitive science and human-computer interaction towards sustainability and social justice, in thoughtful collaboration with others. She is also taking joy in the interdisciplinary and big-picture education offered by the programme. Christina's current research aims to understand the sustainability potential of behaviour change and energy efficiency technology, taking into account hidden variables like building energy baselines, rebound effects and user behaviour. More generally, Christina feels excited about research that holistically addresses the environmental and societal impact of technology, including algorithmic bias, persuasive design and the technology's embodied energy. Alongside her research, she works as a UX Designer for a green energy startup, listens to podcasts, and enjoys vegan baking and long walks in nature.

ACKNOWLEDGMENTS

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