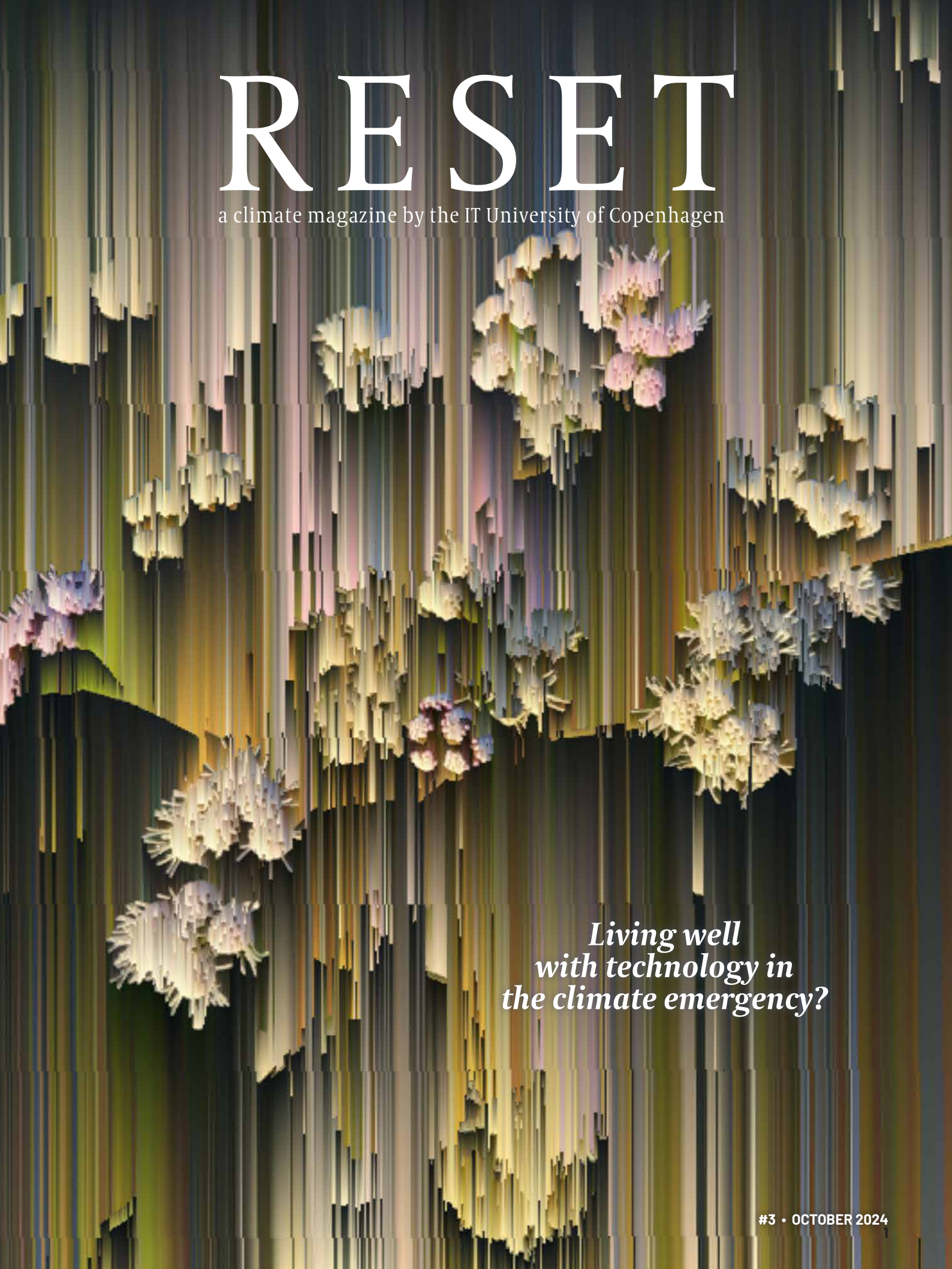
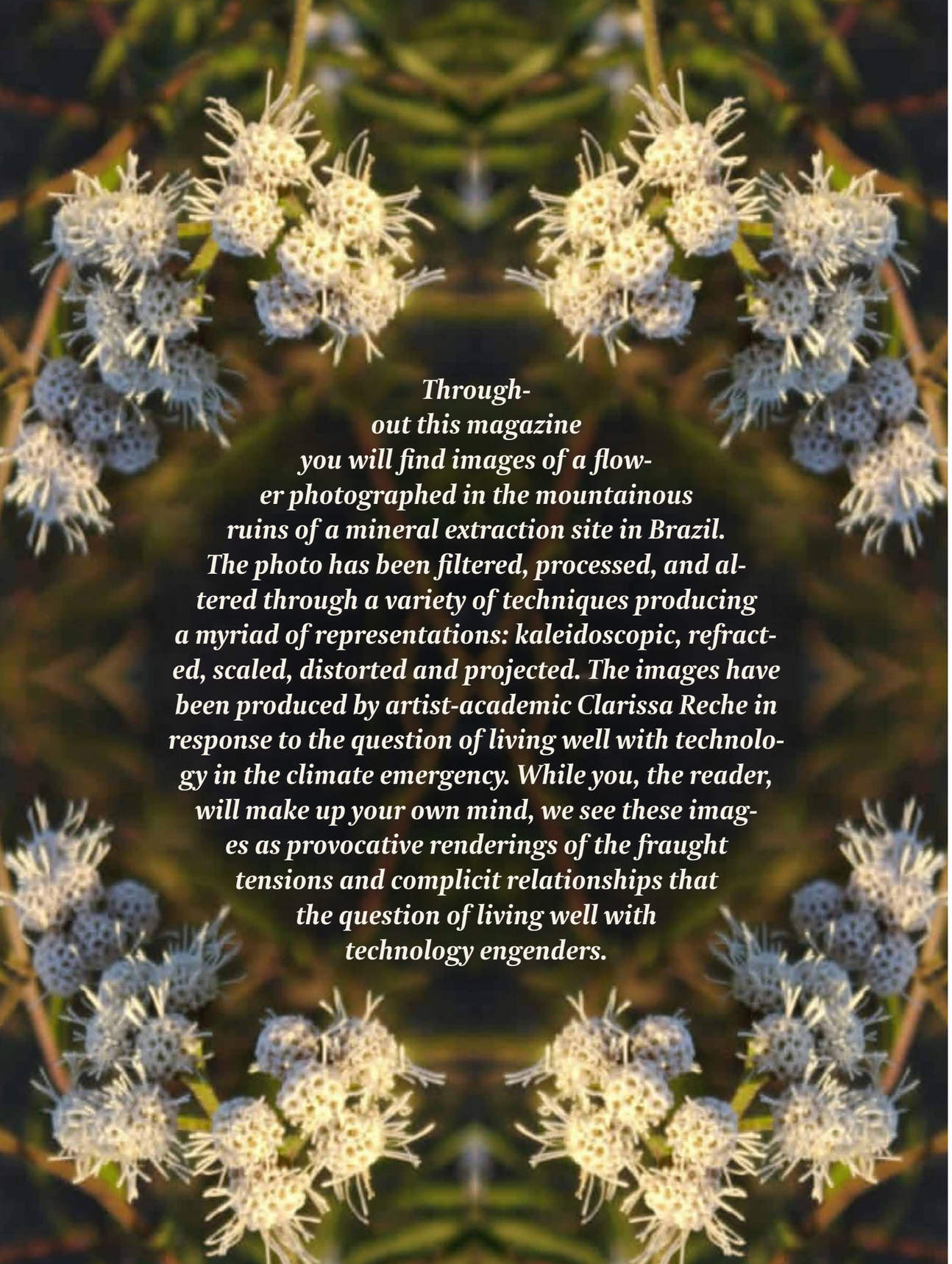

RESET
a climate magazine by the IT University of Copenhagen
Living well with technology in the climate emergency?
#3 • OCTOBER 2024



Throughout this magazine you will find images of a flower photographed in the mountainous ruins of a mineral extraction site in Brazil. The photo has been filtered, processed, and altered through a variety of techniques producing a myriad of representations: kaleidoscopic, refracted, scaled, distorted and projected. The images have been produced by artist-academic Clarissa Reche in response to the question of living well with technology in the climate emergency. While you, the reader, will make up your own mind, we see these images as provocative renderings of the fraught tensions and complicit relationships that the question of living well with technology engenders.

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LIVING WELL WITH TECHNOLOGY IN THE CLIMATE EMERGENCY?

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What does it mean to live well? Oftentimes, this is considered a personal question, framed around topics such as work-life balance, economic security, or dreams of various types, love, family, meaningfulness, even. Or perhaps it is posed as a philosophical or spiritual question, over a glass of red wine or peering up at a blue sky.

But living well can also be framed as a political question. Take Isaiah Berlin's classic lecture on liberty, given in the shadow of the cold war in 1958. According to Berlin, all politics were roughly concerned with either negative or positive freedom. Negative freedom means being free from external interference; the power to be left to one's own devices. Positive freedom means something slightly different: being less about freedom from constraint and more about being free to pursue particular ways of being. Here living well connotes the power to pursue something in particular, rather than merely being left alone. Since the fall of the Berlin wall and the end of the cold war, this negative understanding of freedom has been dominant. In this sense, living well has come to mean living a life of liberal values, ones associated with free markets, wealth, growth, and an ever-expanding sense of individual rights. As such, living well has taken on a particularly liberal inflection, foregrounding the figure of the individual as the locus of unconstrained (and market oriented) action.

But where does technology fit into this? Technology has long been considered a means to achieve freedom, albeit in its negative inflection. The late Swedish statistician Hans Rosling, for instance, famously argued that it was the washing machine that was the key to women entering the work force and gaining an education: it freed up their time (apparently men didn't know how to do laundry!). John Maynard Keynes (mistakenly) thought that technology-based productivity increases would lead to fewer working hours, increasing freedom. The internet – in its early days – was also understood as freedom from constraint. John Perry Barlow's manifesto was a declaration of *independence*, of freedom from imposition by governments in cyberspace. Our relationship with technology, however, has only recently become a mainstream concern: screen time, doomscrolling, social media-driven surveillance capitalism. And now, increasingly, the climate crisis.

The climate crisis puts our relationship with technology into sharp relief. On the face of it, technology is oftentimes posited as either a savior or as an explanation for impending doom. For example, it is claimed that geoengineering could solve climate change, or it will backfire and worsen it a hundred-fold. Or electric vehicles will →

The climate crisis draws out and exacerbates the tensions embedded within this liberal reading of freedom. Being left to one's own liberal devices hardly seems sufficient anymore. In fact, it is central to the forms of planetary destabilization we are experiencing.

replace carbon polluting combustion engines but will come with their own huge environmental footprint via resources and minerals for batteries. A more recent claim is that specifically designed fodder (food for animals) will reduce the methane-rich farts of cows, but statistics underline that meat eating at current scales is not sustainable for reasons beyond farts: think of the vast quantities of land taken up to house and feed animals. Thus, better fodder might offset our not so climate friendly eating habits, whilst dooming biodiversity and the broadscale deforestation of land for animal grazing and food production.

In these and myriad other ways, the climate emergency challenges the modern consensus on living well. Whilst the enlightenment focus on freedom has been a boon for the majority in the west, it has also come with considerable costs, including colonialism, rampant materialism and consumerism. If we focus exclusively on negative considerations of freedom – as freedom from constraint – living well is ultimately an individual matter. And although there are actors on both the right and left of the political spectrum that challenge this, liberal ideas on living well still remain dominant. The climate crisis draws out and exacerbates the tensions embedded within this liberal reading of freedom. Being left to one's own liberal devices hardly seems sufficient anymore. In fact, it is central to the forms of planetary destabilization we are experiencing.

So what can a reading of freedom in its more positive sense offer us? It is more than just saying 'leave me alone so I can get on with whatever I want (mostly, as we said, to do free market rational actor stuff).' Instead, it comes with a spirit of engagement around a particular issue, one that says: 'I want to be free to do this together with others.' In this sense, then, it suggests an answer, however provisional, to what living well with technology might mean. Positive freedom could be having a vision about, for example, the role of screen time in childhood learning environments (whilst negative freedom might be content celebrating the absence of limits in always-available technology).

In the climate space, the dominant form of technological intervention comes through renewable energy technologies and their role in realizing so-called green growth. It isn't difficult to parse this as another adventure down the (forked) pathways of liberalism: the use of technology as a means of satiating the liberal desire to remain as unconstrained as possible, for as long as possible. In response to the green capitalism of renewable technologies another, more positive, vision is to align our actions and technology interventions within a planetary boundaries' framework. Here technology is not fused to growth, but to a series of limitations and constraints based on a scientific understanding of what the planet can bear. This is the antithesis to negative freedom: a vision whose project it is to make constraint a reality as an invitation to provoke societal change. This is not so dissimilar to Degrowth – a theme several of our contributors' touch upon – which offers a radically positive vision of living well through a recomposition of our economic and social infrastructures. While the role that technology plays here is less clear, what is clear is that technology becomes subservient to other considerations (planetary boundaries, inequality, redistribution and so forth).

Asking the question of "living well" does not imply a luddite or anti-technological stance (though luddites get a far worse rap than their historical record deserves). Far from it. But we are critical.

We are not, as tech-investor Marc Andreessen's recent manifesto put it, techno-optimists. Being critical means, in the Kantian Enlightenment sense, not shying away from challenging accepted truths and conventional wisdom. And there is a great deal of dogma associated with our understanding of technology, and particularly its relationship to growth.

So, while we are not seeking to extoll a specific ideological position, we wouldn't go as far as to claim ourselves free from ideology: it is of course a truism that those who claim themselves free from ideology are often the most ideological. We have, as the question of "living well with technology" and the notion of being critical betrays, sympathies with certain positions. Rather than promoting ideology, our goal has been to explore, wonder, and begin the process of daring to imagine what living well with technology in the climate crisis might mean. What other options are there for living with technology beyond savior infused, growth-dominated rhetoric? What does it mean to care for technology? All of these questions are connected, for us, to a desire to go beyond a liberally inflected sense of freedom: moving beyond *freedom from constraint* and towards the positive project of *freedom as constraint*. The articles in this issue explore these questions in a variety of ways, slowly opening the door towards an idea of what 'living well with technology' might mean.

This is important because while "just asking questions" is a favourite academic passtime, the climate emergency demands that we put forth visions, proposals and provocations.

Frederic Jameson famously quipped that it is harder to imagine the end of the world than the end of capitalism. In parallel, we might say that it is easier to imagine the end of the world than to imagine new ways of living with technology. Thus, to ask how to live well with technology is also to draw attention to the idea that the climate emergency not only challenges the environment, but also our social and cultural ways of responding to it. It challenges the use of rationality as the only way to respond to present and future problems. As the indigenous environmentalist Ailton Krenak puts it, we need to imagine and create ways to "postpone the end of the world".

To help our imagination, we feature the work of two visual artists; Brazilian academic-artist Clarissa Reche and Danish architect Lauge Floris Larsen. Both were prompted with the leading question of "living well". Lauge Floris Larsen has used the question to reimagine the home of the magazine, the IT University of Copenhagen, and the technologies that might exist in a low-carbon future university. Clarissa Reche, conversely, has provided a series of kaleidoscopic remixes of her Brazilian surroundings, focusing on the blooming of flowers in the midst of a ruinous mining operation, the metals of which are used in various digital technologies. These manipulated images provide a visual language for the magazine, refracting the nature of Brazil into geometric and psychedelic machine-created "hallucinations". Rather than envisioning idyllic *solar-punk* futures, they are both troubling and beautiful.

Living well with technology in the climate crisis may sound like a provocation. But maybe the horse has already bolted. Maybe it is trite to consider this question while millions of people are clearly *not* living well in the midst of severe climate destabilization. And, lest we forget: millions more *will* follow. In this sense positive and negative freedoms begin to blur as those at the coal face of planetary disruptions might give anything to be *free from* the current structures that facilitate their misery. So, what kind of privilege must we be inhabiting to either spend time on this thought experiment or even dare to think it is possible? To this we say that we understand and empathize with the critique. But developing the capacity to live well isn't a means of daydreaming – it is a necessity. It is necessary for all planetary citizens to imagine and dare, whilst at the same time acknowledging that, for some of us, even this possibility has already been foreclosed.

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HALLUCINATIONS OF TECHNOLOGIES THAT SHALL COME UPON US

Clarissa Reche

Living well with technology in the climate emergency is impossible. With the technology we have today, with the way things are. At least for me, for the people in my communities, and for people all over the world, in every corner of the world, who share with us a way of life that is far from dignified. There is no condition (or technology) today capable of transforming the frightening, present and real hell of the climate emergency into something that protects what for us means living well. Perhaps for those whose lives are confined to the pseudo-security of a closed, air-conditioned building with armed private security, it is possible to live well with technology in the climate emergency. For us, it is not. From the lands where I write, "living well" is a philosophy, a way of life that is materially present in how many indigenous and traditional peoples in Latin America organize themselves. Living well means practicing coexistence and deep respect between the human and non-human beings that make up our reality. In living well, there can be no injustice, privilege or inequality.

But thinking about how technology could be different or how we could live differently with technology is a powerful and provocative proposition. It pushes me to imagine what we might need to do if we were to finally find a way of living well with it. My imagination is what I have left. It's what I protect tooth and nail. So, I spent a few days imagining with this provocation in mind. In the midst of one of the countless "heat waves" caused by El Niño – which is transforming our year into an infinite summer – we went to our ranch, located in the countryside, in a small town called Congonhal, in the state of Minas Gerais, Northern Brazil (you can find it on an online map and get a little closer to me and where I speak from!). Here, the forest and waters still alleviate some of the heat. It was here I was thinking about how to live well. Thinking about what such technology might look like, especially now, at a time where the plants in the garden are drying up and my nose is bleeding because it hasn't rained for 18 days. At the same time, the south of Brazil is facing storms and flooding. 336 cities are enduring calamitous conditions, almost 100 people are dead and countless stories of entire lives are destroyed overnight. →

I remember once seeing that the word “rest” in Tsotsil – a language of the people of the same name who occupy the territory now called Chiapas, Mexico – literally meant something like “climbing on top of a mountain and observing the beauty of mother earth”. I thought this was so beautiful, because it’s something we usually do here too. Near the ranch there is a mountain that we climb to rest. She is beautiful, and she is our friend. I personally feel very connected to her, because like almost all the women I know, this mountain has been systematically attacked and violated in her autonomy and ability to live. We are only able to climb to her top because there is an open path, cleared by a mining company. For more than a decade, large excavators (those marvels of technology) have eaten a large part of the mountain, gradually penetrating its soil to extract raw manganese ore. Manganese is an ore that permeates all of our daily lives, widely used in the manufacture of metal alloys, especially steel, in batteries, matchsticks, glass, fireworks, in the chemical, leather and textile industries, and as a fertilizer. But all these transformations don’t take place here, in the same soil from which the ore was pulled. From here it goes in trucks to the port of Santos, and then straight by boat to China. Just like that, raw. After all, this is our great colonial cross to bear: exporting our violated nature in its most brutal form and importing the beautiful, foreign patents and technologies these raw forms help to make.

From the top of the mountain the view is breathtaking. Seeing the sunset there is something indescribable. Going up, we pass through a path of destruction, with piles of ore waste alongside abandoned machines. To me it looks like an alien place, like Mars or something. It seems that my mind cannot accept that such a place could be part of Earth. Passing this scene – which is always desolate, and always a little fascinating – we arrive at the plateau: created by machines piloted by poor men, employed by rich foreign men. A few months ago, we noticed that something new was happening there: the plateau had been abandoned and another mountain, just a few dozen meters away from our friend, was being primed for eating. Going up the mountain this time, we were scared: the scar on the new mountain was already huge. However, our friend’s plateau was covered in thin but strong and colorful vegetation. We could barely get to a vantage point from which to see the sunset due to the difficulty of traversing the plant life that had sprung up. That made us extremely happy. The happiness was temporary, obviously, since it was just a matter of looking a little to the side to see how the sister mountain was suffering. Then the pain returned.

Thinking about the provocation of the magazine’s theme, I took out my phone and photographed a beautiful plant, in full bloom, that was growing vigorously from that black floor of disturbed manganese ore. It is impossible to live well in the climate emergency because it is impossible to live well in states of exception. And whilst these states of exception too often become normalized, we fight hard to defend our right to dream of living well in plenitude. Therefore, the technology that can make us live well is a technology that can help us overcome the exception, to produce another reality completely different from this one, to stop exploitation (of nature, of people, etc.). I thought, standing there with my eaten and raped friend, that this technology, which has yet to be created, should help us to be like the plant I photographed and enable us to inhabit areas of devastated experiences. The kaleidoscopic images that I produced and that illustrate this magazine were made from that photograph, enlarged, deconstructed and reconstructed in an app on my phone, which probably carries some manganese within it in some component, perhaps even the manganese from my friendly mountain. The images are hallucinations-dreams of a better future. I hope that these images also act as an invitation to those of you who read this magazine, sitting thousands of kilometers from where I am now, dreaming of becoming IT professionals. This invitation is to imagine and dream with me, with us, to imagine a technology that will, perhaps, finally help us to live well.

Abraços calorosos.

Clarissa Reche
Artist

Technology: Saviour or Doom?

A reportage from Folkemødet 2024

Michael Hockenhull

“Oil is a bad thing, but this is a good song,” exclaims the political leader of the Red-Greens, Pelle Dragsted from behind the music mixer as he pumps out-the 2004 hit song “Gasolina” to massive applause from the crowd. Ending his DJ session with cultural aplomb, he dives headfirst into the crowd and surfs away into the night. As images go, it’s not a bad one to illustrate the weird political and cultural mash up that is Folkemødet.

Folkemødet (the people’s meeting) is an annual event which takes place in the otherwise sleepy and picturesque town of Allinge, on the island of Bornholm. A four-day festival of intense democratic exchange, hosting 60.000 participants milling around amongst 200 stages, booths, and food trucks to listen, debate and discuss the

Picturesque Allinge.
© Pelle Rink

topics of the day. Inaugurated in 2011 after inspiration from the Swedish political event "Almedalsveckan", the Danish version was a run-away success from the get-go.

While a certain elitist critique of the event justifiably persists – that is, who gets to attend and who gets to speak here is unevenly skewed towards power holders such as politicians, lobbyists and corporations – it continues to be an occasion where democratic ideas can be engaged, or even experimented, with. It was in this spirit that we here at RESET sought to bring the magazine's theme to life – What does it mean to live well with technology in the context of the climate crisis? – as a topic of discussion for political actors (the Danish newspaper Politiken and an assortment of invited guests) and the general public. We assembled a good-sized delegation: several students and researchers contributing to and representing RESET magazine as well as the ITU's Center for Climate IT. We also joined forces with the Center for Digital Welfare, since the topic was of relevance to them, and were joined by ITU Assoc. Professor Jonas Fritsch.

To help the event draw a crowd, we were persuaded to give it a more savvy, dare I say, dramatic title: "Will technology be our saviour or our doom?"

In opening the discussion at the charming venue, Rosengården, the moderator, journalist Jonas Pröschold, asked the crowd: 'how many here think that technology will solve the climate crisis?' Over half of them raised their hands, earning a seemingly surprised comment from Pröschold about their optimism, who then gave each of the panelists an opportunity to answer the question. Our panel was composed of ITU Associate Professor Jonas Fritsch, Communications Advisor and author of a book on greenwashing Astrid Haug, Partner and Head of Innovation & NewTech at KPMG Bent Dalager, Director in Teknologirådet and author Rune Baastrup, and consultant Oliver Anton Lunow Nielsen. Taken together our panelists represented a good mix of research and science, policy, as well as corporate perspectives, and young(er) as well as older participants. That said, with one female, one non-binary panelist, and three male panelists things could have been better in terms of representation. And that's without even mentioning how this event is almost an entirely white constituency. #Folkemødetsowhite

Central to the debate was a cry for technology to be more visible in climate change discussions. And despite the odd plea for a ban on algorithms or more tech regulation, there was little technology-skepticism or outright luddism. Rather, there was a call to engage with technology based on the idea of "What we want, rather than what we can." In other words, we should not develop and use technology just because we can, we should do so based on conscious, collective and deliberative decision making. On the whole, a more democratic vibe (probably unsurprising) towards technology development.

To live well with technology – understood as both mobilizing technology for more sustainable futures as well as simply living better – our panelists said, cannot be determined by research, nor technocratically arrived at: it must be reached through democratic conversation and decision-making. Regulation, planning, individual action, associational life, companies and corporations: all should contribute. Conversely, as the show of hands to the moderator's question had indicated, the audience were more optimistic that technology alone would be the solution.

What to make of this divergence between experts and the public? It is difficult and risky to interpret a simple raising of hands. Perhaps the very question we are exploring contains part of the answer: whether we see technology as that which helps us to live well or not, it is an inexorable part of all of our lives. It is hard for most people to imagine that the technological explosion which has been characteristic of their lives so

Credit: Center for Climate IT, ITU

far, won't continue apace and won't deliver the solutions we need. Experts be damned.

We were not alone, it seems, in our desire to ask what 'living well' in the context of the climate crisis might mean. Other panels posed not dissimilar questions: "The good life in a sustainable society", "Utopia and fear: three possibilities of a climate neutral feature", "The meaningful sustainable life", "The good life in a carbon-neutral future", "Can you live 100% sustainably?", "The good life vs sustainability: Can we have both?" and more.

Our RESET delegation was a decent size, and as such we had the opportunity to see various parts of the festival. We set out to visit similar events to our own, weaving through the packed crowd from one stage to another. When we met up in the evenings – either serendipitously or as planned – we discussed the events we had seen, their themes and the quality of discussion. In general, we found a lot of similarities: Climate goals aren't being met fast enough, technology is necessary but not sufficient to solve the climate crisis, more political action is necessary, change is difficult yet has to happen, degrowth is interesting but somewhat unknown. And finally, somehow, our lives will have to change. In general, panelists tended to agree with these statements as well as one another. There were calls for more public debate, more action, and more research(!) But while many events explored what the good life might be in the light of the climate crisis, there were far fewer that honed in on the question of technology and its role in this supposed good life.

Unsurprisingly, neither our event nor any of the others we attended yielded the definitive answer to how to live well with technology. Or for that matter, whether technology would be our saviour or our doom. Most of the debates seemed reflexive and engaged, producing various suggestions

for incremental improvements, and admissions that we “need to have that conversation.” Incremental improvements and endless conversations are, of course, compatible with a particular understanding of technology’s role in society. One where everything can either be solved in the next software update or discussed ad infinitum.

There were also calls for more radical changes, but often these were presented defensively, their proponents probably used to being painted as idealistic or unrealistic. In that sense Folkemødet seemed to mirror Danish society at large; a place where the people in charge claim to be the adults in the room; discussing, deliberating and not doing anything rash. Assuming that a solution – whether market or technology-based – will, of course, present itself, as long as cool and incrementally minded heads prevail.

But perhaps our foray into Folkemødet showed us that cool heads are starting to heat up, as the topic of living well with technology seems to be increasingly prevalent in policy and political circles. In a way this is unsurprising, given that we have been discussing climate change for the last 20 years. But this begs the question: why hasn’t it happened sooner? The pace of climate change is rapid and so we must also quicken our efforts to make up for lost time. We do not have time for cool heads to take an ice age to decide, moving incrementally as they go. We need to get a good grasp on our relationship with technology, and fast.

Living well with technology means using it to do what we want, rather than simply doing whatever is possible because we can. But this of course begs the question: who is the ‘we’ here and what do ‘we’ want? And what if ‘what we want’, is what got us in this mess in the first place? At least, when our wants and desires are premised on techno-market solutions, they feel a lot less democratically inspired than our panelists would like to imagine. But Folkemødet is not necessarily a place to find answers. It is mostly a place to foster dialogue, raise questions, and generate democratic vibes. In essence, a small pocketspace of momentary deliberative reason engaging with itself. And isn’t this form of Habermasian deliberation itself simply more of the same: a slow, incremental approach to social change at a moment when the world is under incredible strain?

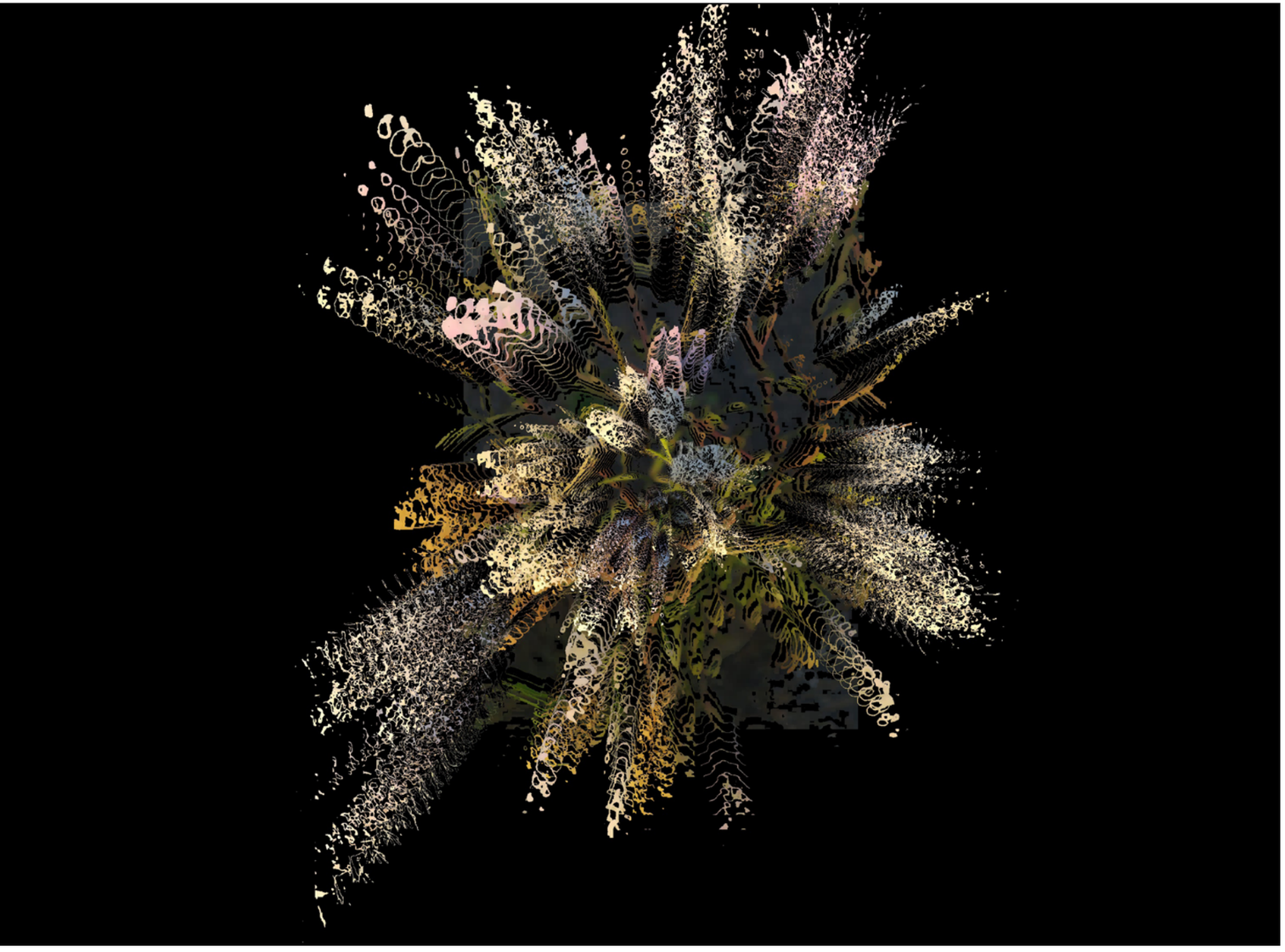
Perhaps what is missing from Folkemødet, and in our wider discourse on climate change, is that which cannot be captured in deliberation. Habermas famously argued that liberal democracy was built on deliberative spaces free from force and domination. When we are free to talk without fear of reprisal or censor, we can find compromises in the best interest of all. The climate crisis is one clear indication of the failure of this deliberative spirit. Maybe what Habermas forgot – beyond the more obvious idea that domination persists – was both time and the (non-deliberative) other. This, if anything, is what the crisis has been teaching us. We are simply running out of time, and the other (the planet) will not be deliberated with. The climate burns, floods, envelopes, heats up and cools, all in patterns alien to immediate human dialogue and distant from a cozy island in the Baltic Sea, such as Bornholm. It is a collection of forces that will most likely dominate our lives, no matter how much we seek to reason with each other.

However, we do not mean to argue that we should abandon dialogue and reason. In the face of the climate crisis, we must hold on to dialogue, reason and democracy – but also go beyond a form of politics that doesn’t take time and the other seriously. What might that look like: materialist, activist, planetary? Technology and the climate crisis are both ever-present in our lives, yet oftentimes in the background. Our panel at Folkemødet, and the entire festival demonstrate that dialogue is necessary, but not sufficient. Folkemødet is important, but the real work happens back in the everyday.

Michael Hockenhull
Assistant Professor

CYBER TENURE, GRAY ENERGY OR *THEIR* COMPUTATION ON *YOUR* MACHINE

Ahmet Akkoç



Can what is "sustainable" for a software company simultaneously be harmful to the environment *indirectly*? Many companies are designing software to take advantage of the resources on the user's machine. Let's call this *Cyber Tenure*. Tech companies are increasingly using *cyber tenure* to minimize their own energy costs, by moving the burden of computation to consumer devices. Consumer devices are only as "green" as the power grid those consumers are connected to. We might call this *gray* energy. This is an essay on *Cyber Tenure* and *Gray Energy*. Or, put more simply *Their* Computation on *Your* Machine!

Cyberspace, Fragmented

Cyberspace has always been fragmented: the infrastructures of the Web are built on a combination of diverse systems, functions, sites and devices. Through a particular turn of events, computers went beyond their origins as war machines and became an amenity. Suddenly everyone had a computer! But there was one problem: costs. Both for manufacturing and powering computers. Initially, there were two competing philosophies on how to make computers economical: the personal computer or shared computing.

The first approach was the 'personal computer' or 'workstation'. The idea was that end consumers could only afford subpar computers to those used in the military and among certain industries. This is the logic that gave rise to, for example, Macintosh, DOS and eventually Windows PCs.

The second idea was 'shared' computing. This idea was suited to universities and big organizations, where multiple users might want to use (i.e. share) one big computer. This idea then extended to the concept of one machine linking with multiple smaller machines. In modern terms, this was the precursor to servers and clients, and thereby computer networks. Many of the Linux derivatives and their UNIX siblings have their origins in this kind of shared computing.

From the first days of the net until today, we have lived through a synthesis of 'personal' and 'shared' computing. Some might call it *ubiquitous computing*, meaning a kind of computation that exists everywhere all at once. Hybrid computers such as PDAs (personal digital assistant), GPS devices and most recently smartphones have come about as mini computers that rely on servers and network connectivity to borrow processing power from bigger machines.

The proliferation of so many different devices is a glorious thing, by any measure. This has been a great era for technology, culture and engineering. However, a question continues to linger: how do you keep ubiquitous computing ubiquitous when the bill arrives? As millions went online, the costs of the network soared. The answer, it turns out, would be to consolidate computational resources to lower the price.

HTML5

After the Y2K scare, the borders of cyberspace changed. Platforms like Google and Facebook consolidated most web traffic. The business models of these companies, whose websites and applications were free to use, depended largely on advertisement revenue. Meanwhile the other players in the Tech industry depended on hardware manufacturing and sales. Here, the business virtue was →

convenience: How could you make more *comfortable* devices? Names like NTT Docomo, Microsoft, RIM and Apple began to lay the foundations of the smartphone.

For the Tech industry in the early 2000's the means for growth was internet penetration, as the hope was that computers spreading to more countries would bring more customers, whether to buy devices or to be advertised to. HTML5 was one of the central means to achieve this.

HTML5 was a standard not meant to be programmed in but to be *served* in. It defined elements such as canvases or video that browser designers would have to implement instead of falling back to clientside frameworks such as Java, Flash or Silverlight. This might seem like a petty decision, but it was motivated by the idea that web-oriented companies should compute everything on their servers and serve to clients whose energy needs would be subsidized. Widespread HTML5 adoption would gradually be pushed through the W3C – the World Wide Web Consortium.

To exemplify this development, consider Google's almost utopian work around HTML5 and their efforts on automated speech transcription. Such technology was much more costly than it is now. Through the underappreciated works of Ken Herrenstien and his accessibility team, Google deployed automatic speech transcription in 2009 for YouTube. That meant handling millions of uploads every moment, which was more feasible on Google's super computers instead of having subtitles be generated on consumer devices one-by-one.

By leveraging revenue for back-end computational resources on the server side, Google and other web-companies developed front-end usability features for the client side. This lowered the barriers for smartphones in terms of data and energy usage allowing the device-companies to also benefit. Everyone could now have a smartphone that could play videos, share files or stream music; but only due to these back-end mega-machines powering the engine. Little did anyone realize the road to Hell was paved with the best of intentions.

The Big Bubble of Cloud Computing

Amazon was perhaps the first large company to realize you did not have to have your revenue depend on web traffic to be the one building the big machines. On the side of their e-Commerce solutions, Amazon began to offer Amazon Web Services from as early as 2002, allowing for the leasing of machines and virtual machines from Amazon. Microsoft would follow with Azure; as well as later Salesforce, Alibaba, IBM etc.

Bit by bit, Amazon warehouses became data centers consolidating very many servers in one place. Machines and energy were costly, and companies were down on revenue especially in the wake of the 2008 recession. It was just more cost-effective, in most cases, to lease resources from Amazon or a similar provider than to build or maintain existing servers.

Following in the footsteps of the HTML5 push, application/software design also shifted towards having servers do heavy-load work and limiting clients to micro changes. Broadly, this was dubbed the Cloud Computing revolution. Unlike HTML5, Cloud Computing was a paradigm shift that was visibly felt by consumers as *physical goods* were slowly replaced by *digital services*. Instead of downloading full episodes or albums, users now had the ability to stream video/audio on Spotify, YouTube or Netflix. Or simply use free Cloud Storage, rather than running after USBs or HDDs.

Recently however, Cloud Computing has come to be perceived as a threat to the environment. As businesses grew they needed more cloud computation. And the more end-consumers bought into those businesses like Facebook (now Meta) and Google, the more cloud computation they needed. Thus, Cloud Computing has led to overgrown data centers, very hungry for power and often directly polluting the environment themselves. Recent work from MIT found that a single data center can consume up to 50,000 households worth of power!

Even so, Cloud Computing continues the trend of companies investing capital to provide hardware for their consumers. An argument can be made that the expansion from earlier web-hosting (for small websites) to machine hosting has also benefited many individuals and organizations outside of the corporate structure. Fediverse, for example, is a project around communicating between volunteer-run servers; and many servers on Fediverse live in cloud data centers. There are still some humanitarian aspects of Big Tech and Cloud Computing that could be seen in projects such as Google's Next Billion Users initiative, Meta's Data For Good and TikTok For Good. But these faint glimmers of hope appear eclipsed due to oversaturation. Oversaturation of the digital market, hyper consumerism and the massive energy consumption of data centers.

The Golden Age of the Web seems to have come to an end, as dissatisfaction from consumers, skepticism from governments and rivalries among companies are beginning to disturb the balance of power. Cloud Computing is increasingly considered unsustainable, and thus undesirable. But what's the alternative? Local computing, letting the consumer's device do the work. A pre-HTML5 Web idea, and yet it came back with a vengeance!

Their computation on your machine

Local computation is a misleading term. Sure, it starts and finishes on the consumer's side so it's "local" in that sense. But a lot of local computation is triggered by external sources, rather than the hardware itself. Try this: leave your phone at home for a day, and its battery will run out from notifications. Turn off notifications or wireless and keep the battery alive!

It is not just signals like screen notifications. A more ambitious local computation example from Google is experimenting with switching to local-AI models which run on the user's device when an internet/cloud connection is unavailable. Other examples include downloading software for mining cryptocurrency, data protection mechanisms like local differential privacy, and everything our ITU SWU students learn about handling background app activity.

These software design choices localize computation to the user's device and thereby reduce the total strain on companies and their data centers. Does this mean a greener world? Nope, it means that no matter how much the big players say that they have made *their own* energy carbon neutral, consumers who have less control over their power grids will become the driver of energy consumption. As consumer devices process data, they consume power. And many of these local-computation design choices drain power much faster. While software people might not realize this, the hardware industry has taken notice. Device manufacturers have to include bigger and bigger batteries to compensate for the heightened energy demand. We can also see this in the changes to screen resolutions and wireless ranges on smartphones. Furthermore, many power grids around the world are still dependent on fossil fuels. Gray energy is on the rise.

The tables have thus turned. Companies now see a clear downside to hosting their customer's computation needs on their data centers. Now they are finding ingenious ways to use consumer devices to meet *their* needs. Before Y2K, local computation was the norm because there was a smaller web. Today, the tech companies are actively colonizing our devices as an exploitable resource. It's practically breaking and entering: If it was malware running on my machine it would be a violation of privacy. If it's bitcoin mining, that is leaching. So I will say it as it is: Now, *their computation* lives on *our* machines.

Ahmet Akkoç
Alumnus student from ITU

You Already Care

Cyber tenure and Gray Energy are invisible problems. I have not seen them talked about, and when I describe them to others there is a lot of confusion. You, the reader, already care about the climate crisis. You also understand the need for a green transition. You care that both energy providers and consumers are honest. So, when I tell you that the Tech Industry are using your devices for their energy expenses, I think you will care. They are subtle but significant problems, violating ethical and privacy boundaries on the one hand, and aiding and abetting greenwashing on the other. In a sense they are simply continuations of the history of computing I have outlined: moving between different degrees of centralization and distribution. Looked at differently however, they represent Big Tech's attempt to have their cake and eat it. At our expense, as well as the planet's.

The Rebound Effect: From Refrigerators to Artificial Intelligence

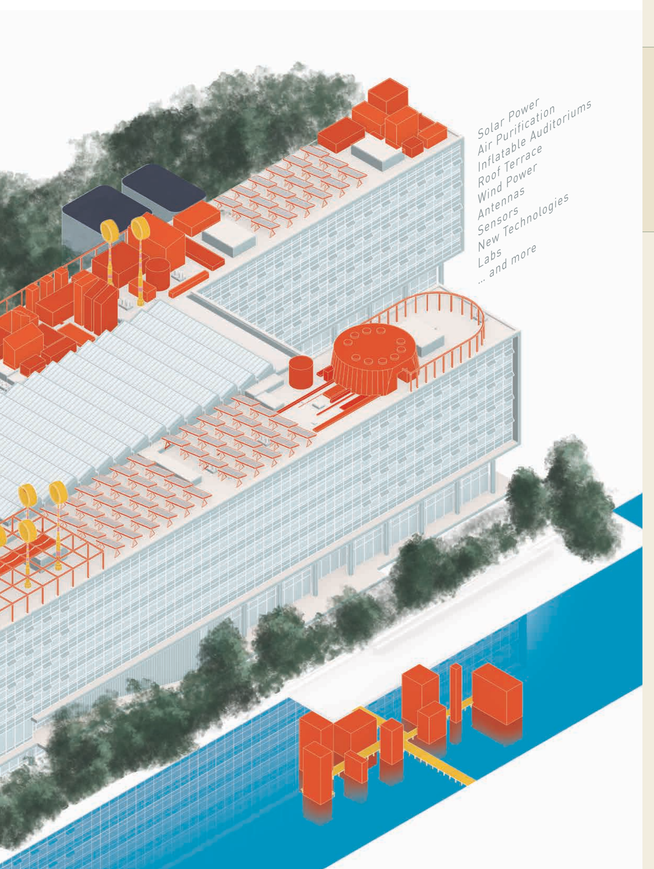
Marie Lundager Sørensen

"What do I even need to look for when buying a refrigerator" my friend asks me. I respond while studying the description attached to the refrigerator. "Honestly, I have no idea". I am getting hit by a cold breeze from the air conditioner. A cold shiver rushes through me. The light is cool and sharp, highlighting the electronics displayed on the shelves. Behind us is a salesman whose gaze is like the one of a panther sizing up its prey. Almost like he is trying to decode how vulnerable we are in this exact moment. He smiles at me showcasing his sharp teeth. I look away and drag my friend with me to another part of the jungle.

The typical example is buying a new refrigerator which is very efficient, but you keep the old one in the basement with your frozen food, and it keeps on running. Perhaps your new refrigerator is even larger and more powerful. So, in the end you're not actually reducing the energy demand in the context of your household, but really increasing it.

Purchasing new electronics is a difficult and confusing task for many of us with salespeople lurking at every corner. Electronics stores have become dangerous zones to enter. To understand the jungle of energy efficient electronics, I consulted with Gabriela Prata Dias, the Head of the Copenhagen Centre on Energy Efficiency. The center focuses on creating energy efficient technologies in developing countries that benefit local communities, thereby furthering sustainability aims. Yet, the task is not as straightforward as it sounds, since energy efficiency easily can lead to overconsumption. This could result in what is called the Rebound Effect. The Rebound Effect is when a product is replaced with a more energy efficient alternative to decrease its energy consumption. However, while the energy consumption of that product decreases, such products become more popular, more used, and hence consume – in an absolute sense – more energy. The intended effect has 'rebounded'. Prata Dias explains,

This is but one of many examples of the rebound effect. The problem of consumers looking for energy efficient alternatives but ending up with more energy consumption is a central aspect of why the Rebound Effect is so complex. Being sustainable is not just about buying energy efficient alternatives but also keeping in mind how we use them. To understand the Rebound effect and how to navigate it in the context of daily life, I consulted Manuel Llorca, Assistant Professor at Copenhagen Business School at the Department of Economics. He explains some important aspects of the Rebound Effect and why energy efficiency is not an easy problem to solve. There are two types of Rebound Effect: direct and indirect. The direct Rebound Effect is where the new energy efficient appliance adds to the overall consumption of the household. The indirect Rebound Effect is when the money saved leads to an increased consumption of a new product or service. A day-to-day example could be a household that is saving money on electricity due to the installation of an energy efficient refrigerator.



From Moonshots to Low-Tech:

Rethinking Future Agriculture

Martin Abildgaard Padalak

Transitioning to an alternative food-system is critical for a more sustainable future. Fostering a desirable tomorrow takes rethinking both what agriculture is, and what it should be. Overall, it demands caring for the whole production chain and not just for a few large actors. The agricultural industry's response to more sustainable agriculture remains the same as it has been for decades: innovation in the form of novel technological solutions. However, a process-oriented, sustainable food system does not build from technology – technology works to support it. That some kind of change is needed seems to be uncontested. But what form such change should take is less clear. One way to begin is to explore what is problematic as well as what it might be like to *live well* with an alternative approach to our food systems

Living with food-systems

How our food systems work is, for most people, a little mystifying. Yet many of us still have some sort of opinion on the matter. It could be ideas on the best dishes to eat or supermarkets to shop in, price concerns, or simply, what to bring to the family table and how to cook it. Regardless of the amount of thought the average consumer spends on the food-system, its products are arguably our most intimate purchases. After all, we put them in our bodies and make them part of us.

But relating to food *production* has only become harder over time: knowing what is cultivated, where it is cultivated, and through which mechanisms is far from easy. This development could be ascribed to the industry's technological advances where a concern for optimization has been at the fore alongside a globalizing tendency to move food production systems out of sight. In Denmark, for example, the majority of fields that people recognize as their food producing landscapes oftentimes carry fodder and biofuels, and not food. At the same time much of what is eaten in Denmark is cultivated abroad. No wonder the public is far from clear what the food production system actually looks like. News headlines sometimes discuss agriculture's impacts on employment, biodiversity, public health and climate, but they often disappear without leading to change or regulation. Through everyday shopping, customers can exercise a small degree of power, by, for example, choosing organic tomatoes grown in a greenhouse in Spain rather than non-organic tomatoes grown in a greenhouse in Holland. Or introducing a meatless meal, once a week. But even if consumer choices in the supermarket can slightly increase demand for organic food stuffs, or lead to a decline in meat-production, they can't fundamentally change the food-production system. So, 'consumer care and choice' is only a small part of the bigger question.

Yesterday's Tomorrow and its Archaic Ideals

At first glance John F. Kennedy's Cold War-era lunar landing is not very relevant when writing about agricultural production and green transitions. Yet, the lunar landing has become a blueprint for innovation in many industries: the idea that the answer

However, they use the saved money to buy a plane ticket. They are thereby increasing their energy consumption somewhere else.

Sustainable living can be a difficult jungle to navigate. It is quite normal to not think about, or even forget about, energy services and our consumption patterns. Energy services are ones related to the production, distribution or consumption of energy. Llorca tells me about how the consumer can try to navigate the Rebound Effect. *Consumers should navigate the rebound effect by taking a holistic approach to their decision-making. In principle, this should involve staying informed about the broader environmental impacts of their choices and being mindful of behaviors that could offset efficiency gains.* Unfortunately, there is no easy solution, he adds. In his own life he tries to stay mindful about overusing energy services.

Both interviewees agreed that education, awareness and policy implementation are some of the most important factors in terms of the development of more sustainable futures. Awareness and policy incentives are something that the European Union and the United Nations already have acted on. Prata Dias explains that an example can be the energy efficient ratings which are translated into letters like ABCD. These are designed to inform consumers, thereby making it easier for them to make environmentally conscious choices. A way to nudge society in a more energy efficient direction can be to prevent the least energy efficient products from entering the market through political intervention. She describes these two initiatives as being *two sides of the same coin. Prevent* on the one hand and *inform* on the other.

Back in the electronics jungle, I walk around looking at the different labels on the refrigerators. Different bright colors are shining back at me displaying the energy grading. My hands are touching the surface of the cold refrigerator. "I really have no idea what to look for. I am going to ask ChatGPT", my friend sighs deeply. "Why not just ask someone?" I suggest. She looks at me with her eyes squinted in suspicion. She looks over her shoulder before she whispers, "I don't trust salespeople. They are just going to make me buy the most expensive things I don't need". I look at her with raised eyebrows. "You do know that Datacenters, cryptocurrencies, and AI were responsible for 2% of global energy demand in 2022 and it is expected to double by 2026. You are not using the right tool if you want to become more sustainable".

Prata Dias explains that it is a two-sided problem. Artificial intelligence enables energy efficient alternatives, but it requires a lot of energy to function. An example could be the introduction of digital solutions for managing buildings or other energy systems. A lot of energy can be saved because of remote controls and sensors. However, these systems can create more data processing and data transfer demand. Furthermore, this generates a need for installing more datacenters. Prata Dias adds that another problem of datacenters is that for every 10° the temperature of a datacenter rises the processing capacity drops. Therefore, you need to keep them cooled down. One strategy can be to place these datacenters in colder climates, like in the Nordic countries, so they do not overheat. One of the main issues of the IT-industry is its pace of development and the difficulty for other societal actors to keep up. Think of legal frameworks, policy interventions, and so forth, and how they always seem to lag behind the building of sustainable futures. The creation of more sustainable futures, Prata states, always boils down to the same ingredients: policy, training, finance, and capacity building. Aligning these needs with the industry's speed of development remains a real challenge.

Back at the store - things are not looking great… "ChatGPT recommends one brand of refrigerators in terms of storage space, and another brand in terms of energy efficiency. However, the energy efficient option is the most expensive one upfront. How do I even calculate which is the most cost-effective in the long run". My friend is scratching her head while staring at her phone. "How big is the price difference between the two refrigerators?" I ask. I am trying to look and compare the signs over her shoulder. I try very eagerly to look and decode the numbers on the sign when a sound interrupts me. A mild snarling. "Can I help you with anything". I turn around and look straight up into a big smile with sharp teeth. "N..No..Nothing" I stutter. My voice is shaky. "Are you sure? You have been standing here for some time now" he continues in a soft enticing tone. I know I have only a few seconds to respond. I take my friend's hand and respond with a polite smile "We don't need anything from here". Then we run.

SOURCE: Electricity 2024 - Analysis and forecast to 2026 (windows.net)

Marie Lundager Sørensen
Student

Architectural Reimaginings of a Sustainable ITU

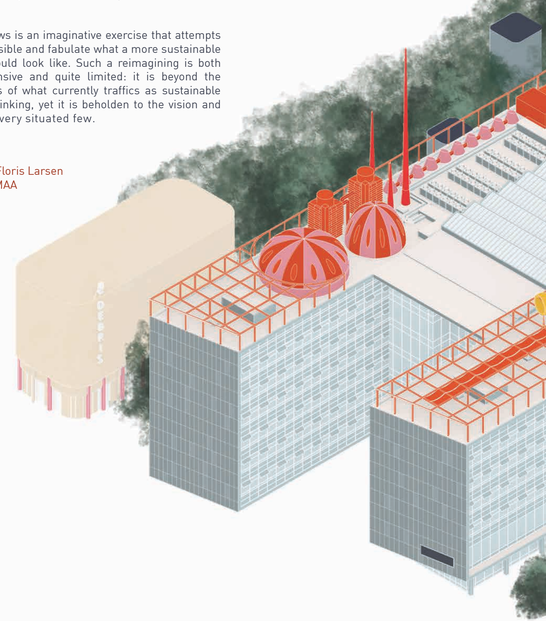
The IT University of Copenhagen faces a significant challenge. Like many other professions, industries, and sectors, the university system also needs to move towards more climate friendly futures.

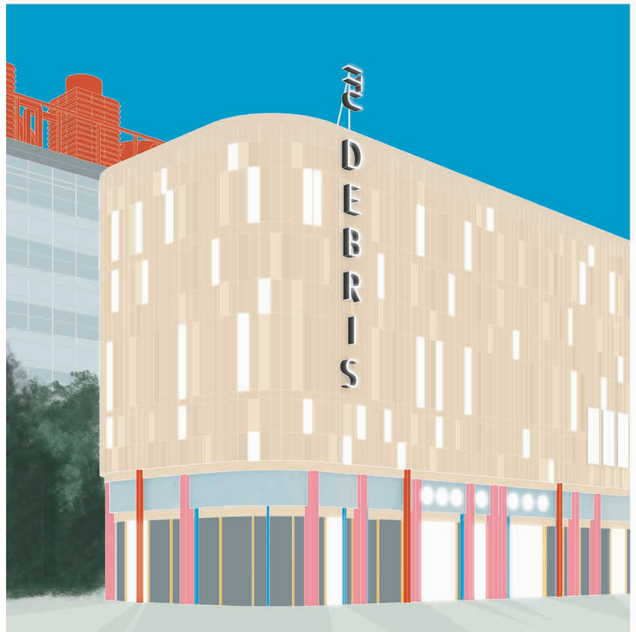
IT technologies are often seen as central in this endeavor. But, while it is well known that other sectors rely upon the IT industry to secure these futures, what is less well known are the sustainability consequences of the industry's own actions (carbon, materials, etc). The invisibility of these consequences remains a challenge.

What follows is an imaginative exercise that attempts to make visible and fabulate what a more sustainable campus could look like. Such a reimagining is both quite extensive and quite limited: it is beyond the boundaries of what currently traffics as sustainable campus thinking, yet it is beholden to the vision and voice of a very situated few.

Its point of departure is to envision the ITU as a large computer, with exhaust and ventilation systems, cooling devices, sensors, screens, energy consumption, and the thousands of people who use its infrastructure on a daily basis. It is time, we think, to look at the architecture that supports the architects of IT. The challenge we set ourselves, therefore, was the following: to ask what would it mean to make this architecture both more visible and more sustainable?

By Lauge Floris Larsen
Architect MAA





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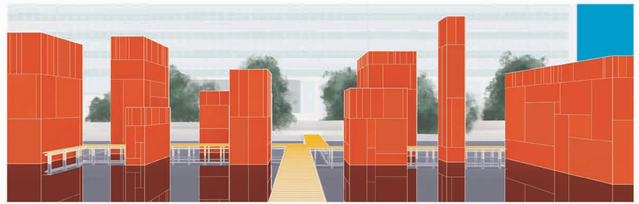

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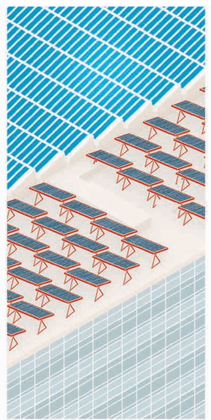

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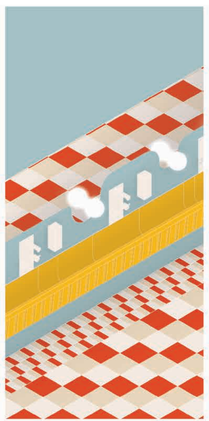

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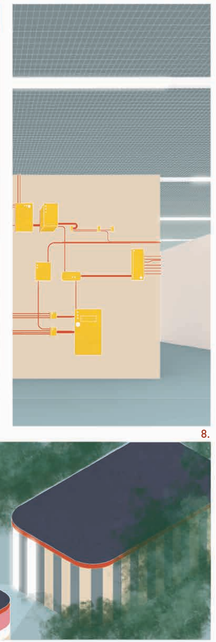

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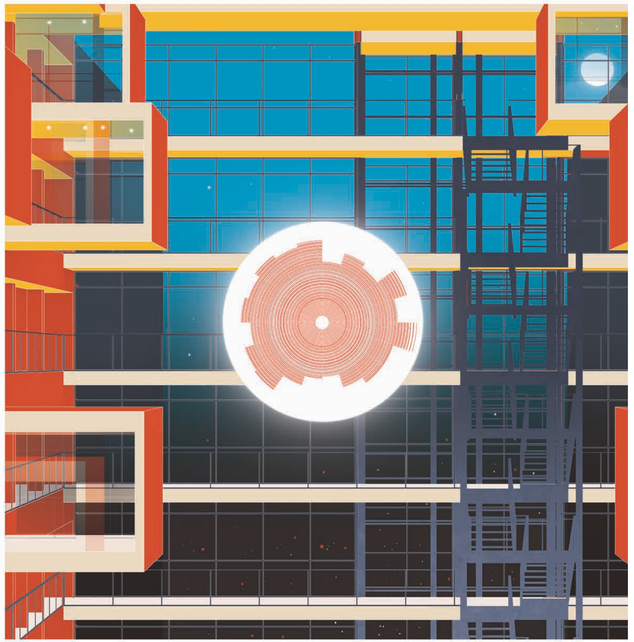

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10 FABULATIONS

1. Debris Department

The IT University needs a materials bank, exchange center, and recycling department for obsolete hardware and debris. Over time, this could evolve into a learning archive of technologies, where past mistakes and hidden treasures can find new life.

2. Local Servers – Local Cooling

Local production is essential to any industry with genuine green transformation goals. The IT University should keep data locally. Servers could be housed on campus, water-cooled in front of the buildings—an immediate sight for anyone arriving at the university.

3. Local Energy Production

Local production must include energy. The roof offers a significant energy source: a place of no shadows, no hills, that is currently put to limited use: ideal for exploring the intersection of future technologies and IT.

4. Heat Reuse Unit

The cooling system should integrate with the building's other functions. Excess heat and energy from the server department could cool water in the summer and heat the campus in the winter.

5. Reserved for Energy-Aware Algorithms

Space should be reserved for the future, which must be greener. Make it easy for employees to get together to discuss IT's climate impact, by providing plenty of pleasant formal and informal meeting spaces.

6. Passive Space

Can we engage with technology without electricity and the internet? A more radical on/off scenario might emerge, where constant connectivity is unnecessary. Perhaps technology's role also involves creating unexpected phenomena, prompting reflection beyond the realm of data.

7. Off-Peak Double Use

Outside of peak hours, the IT University shrinks in use. Only parts of the campus are active during these times. After hours, why not invite NGOs, activists, and grassroots organizations to use the space. As staff prepare to leave in the early evening, a new agenda can take over, leaving behind knowledge for the next morning.

8. Data Distribution Surfaces

Cables, pipes, and power connections are unavoidable in electronics. Make them techno-ornaments on campus, providing visibility and flexibility for quick replacements, location identification, and overall understanding. Instead of the building adapting around the cables, let the cables flow through the building.

9. Parking Transformation

Repurpose the parking lots for bio-IT labs and radical technologies. With excellent public infrastructure only a few hundred meters away, let's transform the area into a park with a myriad of wild IT and biodiversity experiments.

10. The Climate Scale

Marvel at the Climate Scale: an installation displaying ITU's energy consumption and carbon footprint. What better tool to remind us of ITU's connection to the environment.

to current problems lies in unimaginable technological solutions: 'moonshots', as they're called. 'Moonshot' used to mean a "long shot," something unlikely to happen. But as an innovation term it has come to mean something along the lines of, "an extremely ambitious project or mission undertaken to achieve a monumental goal."

The agriculture industry, like many others, has also adopted a "zero emissions" target. The industry's main actors have a positive outlook and imagine a future brimming with 'moonshot' technologies. The secret ingredients supposedly required for the undertaking to make sense are bright minds and will-power. However, a closer look at most agricultural "moonshot" technologies reveals that their best-case scenarios still leave a lot to be desired.

Let me give you one example: the "methane vaccine." A vaccine envisioned to limit cows' substantial 'fart' emissions. Animals injected with it would, so the story goes, create antibodies that directly target their methane producing microbes. According to the United Nations methane from ruminants makes up more than a fourth of all agricultural sector emissions, so such a technology would be an amazing breakthrough. While methane breaks down much quicker than CO_2, it is much more potent and thus harmful for the atmosphere. And this year a biotech company called "Arkeabio" published promising results of their research into such a vaccine. Arkeabio's prototype vaccine brought down the methane emissions of →

"Living well with agriculture takes a mindset that gives priority to prudent solutions and not merely moonshot ventures into the unknown."

5 cows by nearly 13 percent over a period of 105 days. The company expects to be able to sustain reductions of 15-20 percent with an effect lasting for 3-6 months.

The trouble with a concept like a methane vaccine is that it's tested in isolation, far from the rest of the production chain. It does not reduce other harms, like deforestation. Nor does it free up the land used to grow fodder for cattle, or contribute to biodiversity. While moonshot technologies promise to make agriculture great again through quick fixes, what they end up doing is upholding the current production systems alongside its many (and still) unresolved problems.

My sense is that thinking the agricultural system anew is a far better option than merely optimizing the one we have. Less moonshot technology and more humdrum research has shown that grazing cows on grass fields (their digestive systems are, after all, developed for this) emits up to 30 percent less methane than those fed in stables. This, of course, would come with its own set of problems (space, for example) so maybe downsizing dairy production entirely would be the best way forward. But let's leave that argument for another day.

Martin Abildgaard Padalak
PhD student

Tomorrow's Yesterday of Timeless Practices

Becoming a farmer today is near impossible. All the land and equipment required to turn a profit means that newcomers usually need to acquire life-long debt. And such newcomers can either be more conventional farmers or those outside the dominant food system who supply, for example, niche markets such as high end restaurants or artisan farmer's markets. For the average consumer it means that buying non-conventional products isn't feasible. Government subsidies are responsible for maintaining this imbalance by focusing almost exclusively on large, monocultural farms. Directed at small-scale agriculture instead, subsidies could support the farmers of tomorrow and make it more likely consumers could buy food from a place they know. Likewise, the research into "green" agricultural technology rarely focuses on supporting practices already known to be holistically sustainable. It tends to develop patents for animal production or "plant-based" foods that need multiple intermediaries and factory processing to become edible. This is not to suggest that plant-based foods should not be a bigger part of our diets, but to suggest that such a transition might not be as desirable if it only lengthens the distance from farm to fork. Or if it requires additional energy for food-processing by, for example, extracting proteins from otherwise inedible grass or culturing meat in vitro (instead of just growing vegetables). Or if it doesn't support small-scale agriculture.

Living well with agriculture takes a mindset that gives priority to prudent solutions and not merely moonshot ventures into the unknown. The scramble to the future with old milk in new bottles should be dialed back, and lunar-mission sentiments left well alone. Looking to the past reveals some of the wisdom needed to build a more desirable future. Age-old techniques, abandoned in favor of modern efficiency and scale, once worked in tandem with Earth's non-human ecosystems. These aren't super 'cool' (like moonshots), but laborious, as they rely on manual labor within smaller scale farming. Admittedly however, romanticizing the past isn't unproblematic either. We shouldn't necessarily go back to things as they were or reject technological innovation. Maybe the key to 'living well' with farming technologies means less moonshots and more people-based-farming: a world where farmers use technology to the degree it makes sense to them, easing their work and making lives more meaningful, whilst supplying food to their wider surroundings. This is very different to making farming technology the lynch pin around which entire production systems rotate. Might it not be a (small scale) technological marvel – a technology of 'living well' one might say – if consumers actually knew, and enjoyed the knowledge of, how the food on their plates got there?

ENOUGH-NESS
some thoughts on sufficiency

James Maguire

Currently, one of my (almost 5-year-old) daughter's favorite bedtime rituals is to read the book, The Lorax: a 1971 publication from the famous children's author, Dr Seuss. She loves this book: its evocative colors, the many and varied imaginative creatures that inhabit its pages, the rhythms and rhymes of its language. But despite the joy she derives from the book, the storyline is, quite simply, incomprehensible to her.

In the story we meet the *Once-ler*, an unseen creature living in the towering ruins of a moribund factory, strewn across a one-time mystical forest landscape. Telling its story to a small boy, the Once-ler recounts its life through its misadventures in this forest, a place where colorful silken leaves once flowered forth from the trees. Consumed with the idea of producing something useful from the forest – in this case, a garment – the Once-ler proceeds to set up shop amidst the wonderous forest trees. It chops down a single tree, makes a garment, sells it, and, well, even those not familiar with the story line can no doubt guess the rest. Predictably, it continues to cut down ever more trees, make more garments, make more money, and, alas, produce more environmental destruction.

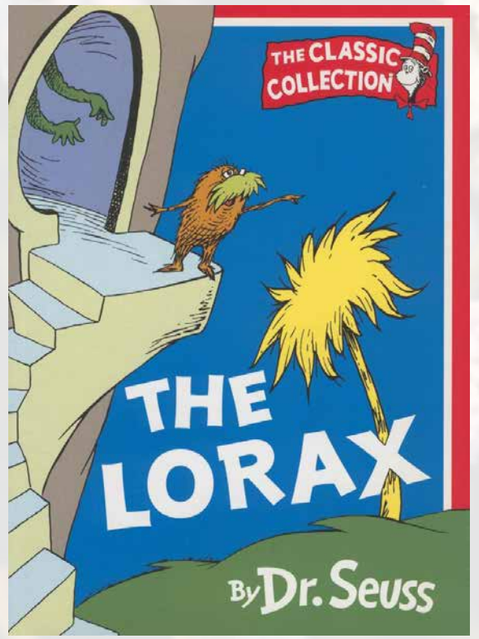
It is usually at this point in the text that my daughter interjects: crying *enough, enough*, as the last tree falls to the ground. I'm never really sure if she wants me to stop reading because it's simply too much for her to bear, or if she is admonishing the *Once-ler* to stop. Or both, perhaps. The story, of course, pays no heed and continues towards its finale. The guardian of the forest – *the Lorax* – appeals to the *Once-ler* on behalf of the forest inhabitants, pleading with it to stop its ruinous activities. But to no effect. One by one, the animals leave the decimated, polluted landscape; first the honey bears, then the fish, followed by the birds, and finally, even the Lorax. Grabbing itself by the seat of its pants, the Lorax levitates into the sky, flying towards the one small patch of remnant blue in the otherwise (by now) toxic sky.

While the parable of this book – one of the first child-friendly critiques of the rapacious nature of industrialism – is quite clear, so is its resolution, at least to my daughter in her cry for enough. And it is this question of enough – or what it means to practice *enough-ness* as a mode of living within our current regime of planetary instability – that I want to take up here.

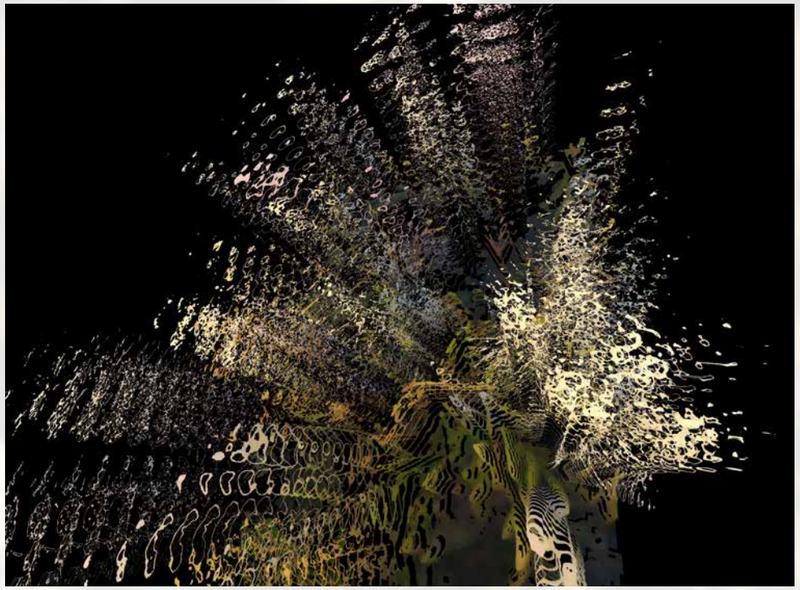
My instinct is that the term enough needs an overhaul, or at least a helping hand to do other, more joyous, work in the world. In one sense the word has become somewhat disdainful. The dominant – dare I say liberal – meaning oftentimes translates it as a synonym of constraint: as that which impedes us from doing the things we want to do. And we don't do constraint very well. Much of the material and social infrastructures of contemporary western existence are predicated on the need, or more strongly, the right, of the liberal subject to be unconstrained.

Think about the cycle of globally interconnected economic systems that augment and facilitate our capacity to live however, and wherever, we want: making, using, and disposing of resources at will. The only 'relevant' constraint here is the individual's capacity to spend. And while this is a functional constraint for many, it is merely an ideological fig leaf for many others. What has this got to do with technology one might legitimately ask? Well, such forms of unconstrained existence are very much undergirded by technologies (industrial production, communications systems, technologies of warfare, and so forth). And despite much rhetoric to the contrary, our digital technologies enable a vast amplification of these tendencies, delivering the non-stop, round the clock 'rights' of individuals to live freely and expressively. 24/7 energy, 24/7 consumption, 24/7 on-ness. So, while technologies *can* enforce constraints – borders, for instance – far more often, they are put in the service of overturning them, especially if they stand in the way of consumption.

Perhaps slightly less intuitive, but nonetheless powerful, is the idea that much of the political architecture of western modernity works against the idea of constraint. Think for a moment how mainstream economic policy terms (growth, progress, and development) are not just dominant categories for measuring forms of socio-economic worth but are very much connected to a particular imaginary of the western liberal subject as a free and autonomous being. The very concepts that outline the contours of this subject are coterminous with ideas of the unconstrained self, be it as citizen or consumer. We have rights more than we have duties, for instance. Here we see a recursive, or looping, relation between the political concepts that infuse the infrastructures of capitalism and the forms of life that contemporary capitalism values and sustains. So, it's somewhat understandable that the word *enough* – as both a synonym for constraint and an antonym for all that our political, social, and economic infrastructures valorize – is having a hard time. Implying a



Random House 1957, 1971.



lessening of a state of affairs – less material goods, less desire, less opportunity – and not more of them is anathema to a particular understanding of western existence.

But what might we do about this? Changing the definition of the term is nigh on impossible given the cultural edifice it is embedded within – linguistically, the term *enough* translates across a spectrum of languages to signal a halting point, a place that brokers no further encroachment (STOP, HALT, BASTA, ARRETE). In the absence of this, what, then? Maybe it is more a question of disturbing the web of meaning that conjoins these terms in a particular way. If we can dislodge their semiotics (what they mean) from their liberal moorings (what structures what they mean), then possibilities open up. This includes, amongst other things, thinking constraint outside its liberal enclosures, re-orientating our axis of understanding towards what constraint affords rather than what it negates.

Such work is already afoot. As feminist scholar Barbara Muraca reminds us, thinking *enough* in terms of, for example, desire, doesn't have to signal that we need to desire less. But it does mean reconfiguring our understanding of desire so we can learn to desire differently, better, and even, more. In his book *Less is More* Jason Hickel outlines a strong mandate for the principle of degrowth. Here doing less in the traditional liberal sense of, for example, less work, less producing, less consuming, and so forth, is not a debilitating loss of self, but a means of producing a cornucopia of mores: more time with family, more (and better) quality environments, more health, more life satisfaction. In essence, more thriving. In his book, *the logic of sufficiency,* Thomas Princen describes a series of compelling community projects where people have adopted the principle of enough as a political tenet. Doing so doesn't translate into abstinence, sacrifice, or deprivation, but, in fact, their inverse: well-thought-out limitations upon particular practices (be it cars or timber logging) afford other modalities of living that produce more of the good life. Guardian journalist and author, George Monbiot, invites us into a thought experiment: instead of dwelling within a destructive habitus that valorizes private wealth at the expense of public goods, he encourages us to reimagine an inverted order consisting of private sufficiency and public wealth. Thinking *enough* as sufficiency, it strikes me, offers one way out of the liberal bind that constitutes constraint as a negative existential position.

But from a technology perspective, what might constitute *enough-ness*? Conjoining technology with sufficiency runs somewhat counter to

"It's somewhat understandable that the word* enough *is having a hard time. Implying a lessening of a state of affairs – less material goods, less desire, less opportunity – and not more of them is anathema to a particular understanding of western existence."

contemporary ways of thinking. As David Nye reminded us some time ago, technology is more often associated with the notion of the sublime: the awe inspiring, overwhelming, disorienting sense we get in the presence of something great. An almost quasi-religious sentiment manifested in material form. Renewable technologies work in a similar register, often invoked as saviour: as that which can infuse green transitions with the necessary tools of change. This is no different in the world of IT and digital technologies. Exuberant claims are rampant: here digital technologies are also seen as salvational for efficiency, growth, the *future*. In all of these examples, technology is in the 'awe-making' business: a business far removed from sufficiency thinking.

But there are moves towards sufficiency thinking and practice. Designers of IT systems and digital technologies encourage more caring technological practices. Here, care translates into thinking, making, and living with technology differently: a shift away from cultures of obsolescence, towards cultures of maintenance and repair. In this regard, holding onto, loving our technologies, even, is important. But this form of love is about rekindling our desires away from the constant lust after the new and towards a contentment with what we have. More radical alternatives also exist. *Rewilding the Internet*, for example – an idea proposed by Maria Farrell and Robin Berjon – centers questions of collective and decentralized ownership structures. Here the question of *enough-ness* becomes a democratic concern as smaller federated communities decide upon their own rules of engagement, including environmental impacts. Recently published *Digital Degrowth* by Michael Kwet is an effort in thinking about how to decolonize digital structures and systems. In different yet comparable ways, it seems, *enough-ness* as sufficiency has crept into the slipstream of digital conversations.

Back in my daughter's bedroom, the above rant would be meaningless. Even so, I find it terribly difficult to explain (and not just to her) why the logics governing the Lorax's narrative are still so commonplace. Why has the critique embedded within this parable – which I read as the call to enough – not solidified as a way of living (well?). And yes, I know that five-year olds are infamous for vexing their parents by posing some of life's most existential questions (can the dead dream, was my grandmother a monkey too, you get the gist, no doubt!). But nonetheless, it is engaging this wonderous, unsubmissive honesty that is central to the joy of parenting. But here, I must admit, I am struggling.

To alleviate this, I fantasize somewhat. I imagine myself talking to her in 25 years' time in a world where *enough-ness* is common, and constraint is meaningful. We laugh a little at the power of concepts, their histories, hierarchies, and hegemonies. In her world enough (or its scientific incarnation, sufficiency) is now an apex concept, displacing efficiency as the bedrock upon which all else must stand or shatter. But the path from here to there – from my struggle to my fantasy – is filled with trepidation. Conceptual dams must break, taxonomies must shift, hegemonies must dissolve, and practices must change. In these moments, I think of the faith of the Lorax, as it ascends above the ruinous forest into a tiny patch of blue sky amongst the toxic clouds. I wonder about that blue patch, and how we can rekindle the conditions upon which the Lorax, and its ilk, can return.

James Maguire
Associate Professor

DEGROWTH for dummies

Mille Munch Jensen

Dismantling the prevailing idea of continuous growth as equivalent to societal flourishing is the essence of degrowth. Degrowth advocates that we need to imagine a society separated from growth to be able to address the climate crisis and social dilemmas of our times. In this piece, each section will outline a different concept within degrowth. This piece is a 'degrowth for dummies' guide – but don't worry, I am not calling anyone dumb! I am just aiming to make the topic so clear that even your pet can follow along (okay, maybe not the goldfish). So, let us keep it simple, clear and perhaps even a little fun.

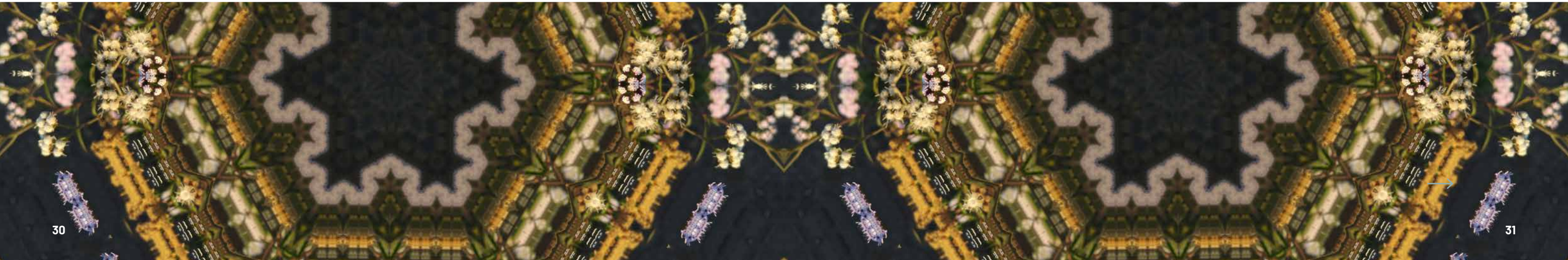
Energy lies at the heart of degrowth. Our current economic growth is driven by ever-increasing energy consumption. One might propose that to fix this problem we should convert to green energy. While green is good, it is not enough. So, strap in tight and brace yourself, because this idea might be the one to part the waters. After all, our current world is counting on the help of green technologies to get us out of our mess. So, what is meant by saying that green is not enough? Simply, shifting to green energy cannot happen fast enough, especially if it is still embedded within our current capitalist system.

But even 'growing' green energy continues to exacerbate the problem rather than address it. As research has shown, most green energy production is additive, that is, it doesn't necessarily replace fossil fuels but gets added to a 'growing' mountain of energy consumption. While growth continues as the engine of development, even its green form won't push back the tide. This is why the Degrowth movement presents the idea that we should abandon growth as our objective. As time continues to tick the climate crisis will only become more difficult to solve. And we don't want to have the bomb explode, do we?

Growth, ah yes, the magical process where like rabbits in springtime, there is always more to come. So, what is the problem with growth? After all, as traditional economics puts it if you make the pie bigger, everyone gets more pie, and all is good. Degrowth, forces us to ask ourselves whether growth is always a good thing. Sure, growth may bring increased material wealth, however, it also comes at a serious risk to our environment and societies. It is like realising that the bigger pie is causing indigestion and making us sick. Instead, we should shift our focus away from blindly chasing growth and stop and consider what ingredients are needed to bring genuine prosperity and well-being to humankind. Rather than making the pie bigger, we should prioritise sustainability, equity, and quality of life. So perhaps we don't need a bigger pie, instead, we need one with healthier ingredients, that we can share more equitably and enjoy in moderation. One might wonder whether Degrowth would, then, be another stumbling block on the road for low- and middle-income countries. However, degrowth proponents do not propose to stop growth where there barely is any. Snuffling out a flickering flame while a gasoline fire is burning next door would hardly serve any purpose. Hence, degrowth should only happen in economies fuelled by excessive use of energy and resources – in other words, mainly the global North. There are, of course, still complications in doing this, so, see below for more.

Resources are used all around us, they encompass everything from raw materials to energy sources which form the backbone of our current economic system. The hunt for resources in our pursuit of ever-increasing growth is like chasing a phantom deer, driven by our illusion of abundance and the false promise of endless expansion. One need not look much further than one's backyard to realise this mirage. Denmark already hit Overshoot Day on the 16th of March of 2024, meaning that if every person on Earth consumed as much as us, we would run out of resources that can be naturally regenerated by the Earth in one year barely 3 months into the year. This should be a sobering reminder that we live in a society of massive overuse. Clearly, we should not continue to use resources which we do not possess if we want to make our societies sustainable. So, what would this mean in practice? For one, we would need to reduce unnecessary production. That is the production that currently contributes to redundant material production and consumption. Keyword – redundant. So no, you are not going to live in a shoebox, but on the other hand, that dream of owning a private jet and flying to the Bahamas will have to be scratched. Another crucial element to consider is how the Northern capital surplus is built on appropriating resources and cheap labour from the South. The North is reliant on the South to keep growing while the effects of climate change and ecological damage are disproportionately affecting the South. Degrowth might allow the South to regain its resources when it is no longer hampered by the Northern countries' relentless hammering to keep the wages and costs of resources low. However, the assumption that degrowth would free Southern countries from the constraints and pressure from the North, and thus enable them to pursue economic and social reforms that benefit the people living there, has been met with critique. One point argues that if the North were to degrow, there would be a 'dependency' knock-on effect in the global south, risking a decline in employment, welfare and inequality – at least in the short run. Clearly, within the degrowth discourse, it is necessary to further discuss how to best address these global dependencies.

Obsolescence is another key problem within our current societies. Obsolescence refers to the way that products and technologies are deliberately made not to last, perpetuating a throwaway culture that encourages consumption. Degrowth advocates for the necessity of durability, and repairability to ensure that our products last for a long time, lessening consumption and making our societies more sustainable. This might be introducing a new repair subject in school, aiming to teach pupils how to best repair different products ranging from mend-



ing holes in shirts to a stuck lever in a toaster. Or holding repair cafes where communities can gather and share skills and tools for repair. Or introduce legislation that enforces products to be made with repair services to ensure longevity. In essence, we need to promote a repair culture and a normalisation of imperfection to create a society which embraces the history and flaws that come with products meant to last.

Well-being in relation to degrowth is about prioritising human well-being over material accumulation and endless consumption. Living well can mean many things depending on who you ask, so what is the idea of a good life within degrowth? Well-being from a societal perspective could include ensuring everybody gets access to healthcare and education, strengthening our communities and social bonds – a society where people share and care for one another. Maybe embracing the concept of enough-ness can help? Whatever we do, living a good life implies developing a sense of fulfilment in our day-to-day, having our basic needs met, connecting with our communities, and finding meaning in all of this. In essence, our societies should be human-centric, not growth-centric. Living well means respecting the Earth we live on and ensuring that Earth is fit for future generations. Without a healthy environment, humans cannot thrive as the state of the earth directly affects us.

Mille Munch Jensen
Student

Time is ticking and the longer we sit back and watch the deeper into the mud we sink. The reality is that we need to do something - now. If we keep pushing our climate goals towards the future suddenly there might not be one. We need to acknowledge how our current actions are affecting future generations, so we can prioritise solutions which benefit our societies not just in the short term, but also in the long term. We cannot let the future bear the burden of today. Current generations have the responsibility to ensure the continuous habitability of the planet. After all, would it not be better to do too much rather than risk doing too little?

How will we then do all of this? We would need a system change since our current system, and the structure it encompasses, is keeping us from being able to solve the problem of the climate crisis. Transitioning to a degrowth world involves rethinking traditional economic models, the reallocation of resources, and our societal structure. There are obvious difficulties in doing this and it is important to acknowledge that it would be a complex transformation. For one, we currently live in a society where business, governments and the market depend on growth, and degrowth challenges this foundation. So, exploring alternative economic models, without the need for endless growth, is a necessary albeit tough nut to crack. But not necessarily an impossible one. A second obstacle we face is how to shift our mentality, one that moves away from the idea of equating progress with material consumption. Instead, we need to shift our cultural values to prioritise communities and sustainability. In essence, we need to reimagine the very idea of what living well actually means. We also need to consider the political challenges, both on a national and global level – enacting policies in which degrowth can be tied with global equity. These are just a few of the many obstacles we face, and there are no simple solutions. But only by considering these factors and starting a conversation can we begin to imagine how a degrowth society might take shape.

The Lazy Climate Activist

Sofie Winther Jensen

If you are a person who fancies culinary escapades or simply a struggling student unable to summon the ever-lovely Wolt courier to your door at every stomach growl, then you might know the newfound annoyance of trash sorting. There is truly nothing more bothersome than having to separate the cans of conserved tomatoes, the plastic that contains the minced meat and the cardboard box of greens. A true inconvenience indeed, and somewhat problematic as these trash sorting expectations push the buttons of Lazy Climate Activists.

Our Lazy Climate Activist is one who is worried. She worries about climate change, and she understands the severe consequences that we are witnessing today, yet she struggles to change her habits and she cannot help but wonder why no one has thought of a better way. She wonders why some clever engineers or innovative designers haven't been able to upgrade this technology.

How can it be that we have to live with a technology that is so old and haggard, one that hasn't been upgraded in forever? Is that really a clever approach to ensure that our garbage is handled correctly?

Many green initiatives demand habit changes. They require us to change our ways, which, as we all know, is not always an easy task. What would you do to help the environment? You see the need for a change in habits, but alas, it is as if this proves as difficult as having to uphold the classic new year new-fitness-routine-me.

This Lazy Climate Activist has tried to discuss this dilemma with many 'proper' climate activists. The ones that truly care with unwavering commitment through both their actions and their very essence. They do not seem to understand how one can continue existing as a Lazy Climate Activist. They do not understand why she does not change her ways or how she can allow something as absurd as laziness to prevent her from being not just climate aware but also climate friendly in all her doings.

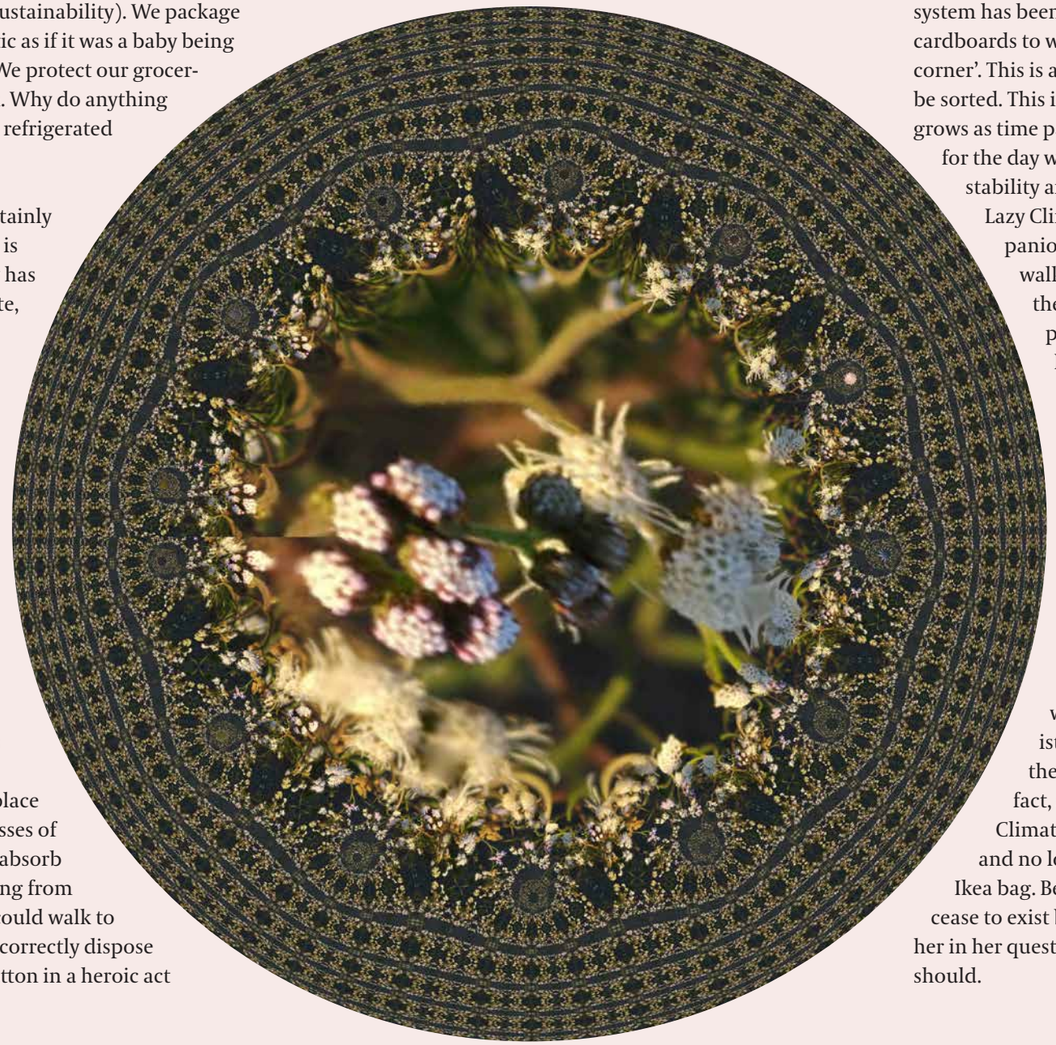
She has tried to crochet her own cotton pads, but these dented re-washable things are simply not as good as the disposable ones. Yet she continues to use them. She has chosen to become a climate warrior, now and forever more.

But the problem is just that this Lazy Climate Activist is not great at changing her habits and does not sort the metallic cylinder that used to house the chopped tomatoes. As a substitute, the canister is given a temporary home on the counter as she still has not got round to organizing a sorting system in her small, big city-kitchen. And in the speed and stress of morning life she throws the cylinder into the ordinary trash bag. In a hurry, she is now off to collect her bike in the basement so that she'll be on time for her lecture. And so, she leaves her apartment knowing what she did and what she chose not to do.

One might ask her why she chooses not to change her ways? This is surely a poor picture of how a young student should behave. So why is it so difficult to bypass the reoccurring act of that metallic cylinder falling to the depths of the regular trash bag? It is indeed a conundrum, and she does not know if there really is a good answer. Maybe laziness – or maybe the overwhelming guilt-ridden list of green actions she hasn't yet taken – is the reason why the student lets the metallic cylinder plunge into the void of the residual waste bin.

Waste products from groceries are a hurdle, as are products produced through the logics of our consumerist society (where convenience is held in higher regard than sustainability). We package our daily bread in plastic as if it was a baby being wrapped in a blanket. We protect our groceries almost like children. Why do anything more than place it on a refrigerated shelf?

Climate change has certainly manifested itself and it is clear to see that the sky has been more tearful of late, as we watch how these tears have turned to floods, flooding our homes, our basements, our senses. These floods have certainly commanded the attention of the media and there only appears to be more trouble coming for us in the future. Perhaps The Lazy Climate Activist could utilize her crafty hands and crochet a gigantic cotton pad. She could place it carefully over the masses of water and let her work absorb all that was once weeping from the heavens. Then she could walk to the recycle station and correctly dispose of this watery ball of cotton in a heroic act of climate action!

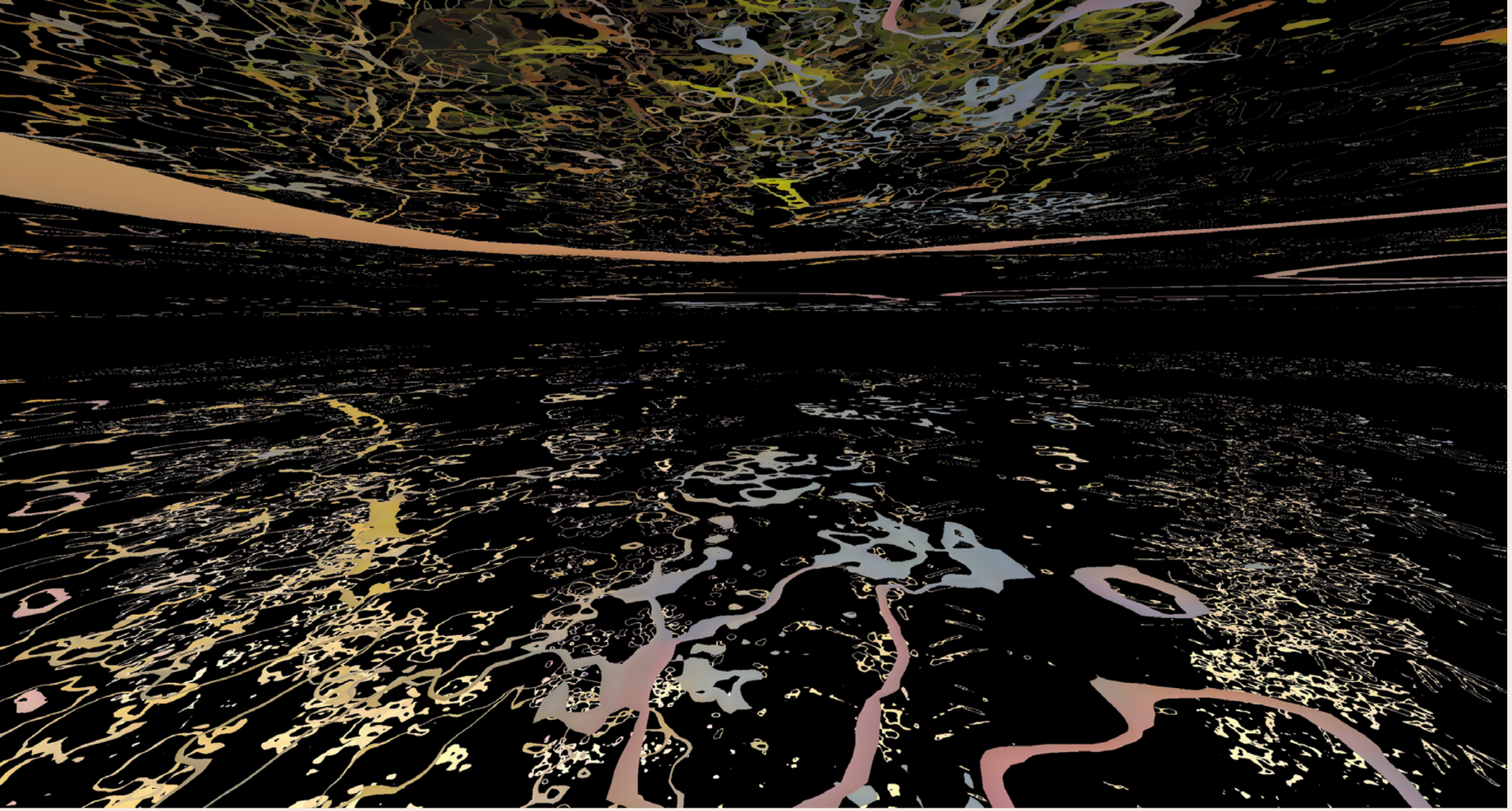


Would she then succeed in her quest to become a proper climate activist, or is this hugely overcompensating home-made cotton pad not sufficient? She might just do better by simply sorting her trash.

One thing that truly puzzles The Lazy Climate Activist is that she cannot see how she should be systemizing her trash sorting. She questions how she will fit eight to ten different trashcans under her sink and if it would be better to simply have two - one for residual waste and one for all the others. Yet this way would also prove to be quite insufficient, as her current system has been to re-home cans, glass, plastic, and cardboards to what she likes to call her 'infamous corner'. This is a corner designated to all that should be sorted. This is a mountain of garbage that slowly grows as time passes, where all trash patiently waits for the day when the pile exceeds the point of stability and falls to the floor. Only then will The Lazy Climate Activist grab her trusted companion, in the form of a blue Ikea bag, and walk the tormented soldiers of trash to the ground floor. Here she will carefully place each soldier in their assigned location and then return to re-build her next mountain. This system is essentially the same as having two trash cans and so The Lazy Climate Activist must continue her search for a better arrangement.

She still hopes for a future where trash sorting is supported by more efficient technologies. It would be lovely if we created a trash can or something entirely different that would help all the Lazy Climate Activists. Then she might not need to crochet the overcompensating cotton pad. In fact, she would no longer exist as a Lazy Climate Activist as the system would work and no longer require the efforts of a blue Ikea bag. Better still, 'the infamous corner' would cease to exist because technology would support her in her quest to do better – just as technology should.

Sofie Winther Jensen
Student



Who cares about data?

Rethinking Data Practices in the Climate Emergency

Felipe Figueiredo

When was the last time you did a backup of the data on your smartphone or computer? And where exactly is that data stored? A backup is a security copy of data taken from a specific device and stored somewhere else. Its main purpose is to secure this information from a data loss event. The premise of a backup is to keep information safe, and if something bad happens with the original data, it can be restored. When you do a backup, you often select which data is important to store and which is not, as well as the place you want to save it to – an external hard disk, DVD, a private server, or even on social media. This prompts the question of which data we store and what infrastructures are being used to do so.

Even if you are not familiar with the technical idioms of IT, you will most likely be familiar with messages from your favorite apps asking, from time to time, if you want to set an automatic back-up. Doing a backup is one example of how we can take better care of our data, by saving and keeping it in a safe space, where it can be stored for a long time, whilst remaining accessible. So, backing up data can be read as a form of care. But the material and carbon footprint of data storage also raise significant care questions, albeit care for our environment. In this sense, then, one form of care (caring for one's data) raises questions about the necessity of another (caring for the planet). How should we think about such colliding care practices?

Who cares?

What exactly is care? According to the Cambridge online dictionary, care is "the process of protecting someone or something and providing what that person or thing needs"[1]. Starting from this general idea of providing for someone or something's wellbeing, care can also assume different cultural formats. In the book *Caliban and the Witch*, Silvia Federici shows how the care practices associated with reproductive labor – such as domestic housework, cleaning, cooking, childcare – have been historically gendered in western societies.

This "care work," she argues, underwrites our entire system of capitalism by, in essence, exploiting unpaid domestic labor. But what would happen if this care work was structurally acknowledged, rather than invisibilized? What if it became a principle and practice at the heart of how we structure our societies: care as a central practice for social change, including its extension to other aspects of existence, such as public health, but also infrastructure, and even the current climate crisis.

When it comes to our digital lives, then, how can we think about care? It is here we need to ask some 'hard' questions about our digital storage practices. For example, what do we know about the servers that store our pictures and videos? Big

1 Reference: https://dictionary.cambridge.org/dictionary/english/care.

Tech companies – via social media and corporate platforms – have become the standard infrastructures for storing these items, but most of the time we do not have a clear idea of their operation and how they process our personal information. What we know is that every year these servers are becoming more power hungry. So, while caring for our data is a question of privacy, it is also an environmental question. In this sense, we need care practices that account for both. Let's consider the former first.

You are the good

Social media has become synonymous with the "internet", and for a big portion of its users, it is an important source of information, communication and data storage. So-called *Big Data* is rampant and has led to very ethically questionable practices. Big Data is very cheap and easy to manage, which means that those companies who have the means of doing so – the ones who actually store our data – are profiting from it. But this also has a broader social impact.

One paradigmatic case was the Facebook and Cambridge Analytica data scandal, where millions of users of the platform had their personal data collected and sold, without consent, for political advertising. Now, with the growth of Generative AI, concern about the massive amount of data being used to train these models is also on the rise. Especially as much of our social media data is being used to train them. The logic that operates through market-oriented social media is that you are free to use it, but keep in mind that your personal data is the involuntary bargaining currency.

Big Tech, Big Climate Issues

To store this data Big Tech companies run massive data centers. While the computer servers that store this data create an image of an immaterial, virtual world, they are, in fact, consuming huge amounts of energy and water – to run and cool down the servers. According to the International Energy Agency, data centers and their related data transmission network account for around 1,5% of global energy consumption, and around 1% of global emissions of CO_2: small percentages, but big numbers.

These numbers are relevant and are on the rise, particularly as AI tools and their models begin to grow – and let's remember, they have in many instances been trained with our data. The data center industry is expected to grow 10% per year through 2030 due, mostly, to the rise of AI. There are still uncertainties about the future direction of the sector, but it is hard to see how this type of growth can help reduce energy consumption and shift us away from fossil fuels. If the IT industry wants to commit to climate mitigation and international agreements, it will need to decrease its footprint and energy consumption in the coming years, not the other way around.

Therefore, the question that arises is how we can reclaim these technologies in a way that links them with the digital needs of societies, communities or organizations. This means not only guaranteeing the sufficiency of IT, but also finding more democratic ways of storing and using our data beyond the profit motives of big corporations. It is well documented how Big Tech companies like Google and Microsoft are abandoning their "Net Zero" climate targets as they increase their carbon emissions. They have never seemed further away from even their most conservative environmental goals. This context calls for climate action in the IT sector and in our digital lives, but how can we live well with our data in more carbon friendly ways? In other words, how can we care about the privacy of our data in ways that also care for the planet?

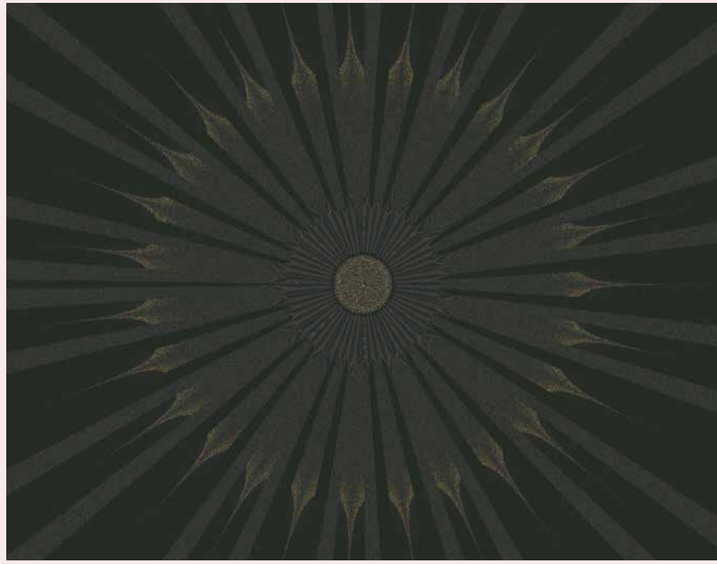
Reclaiming the IT infrastructures

Reflecting on the care practices of data (their social and environmental implications) is one way to think about the problem of how to live well with technology in the climate emergency. From a care perspective, we can think about the way we use and store our data, their physical and logical infrastructures, their carbon footprint,[2] as well as the social impacts of digital capitalism.

Returning to our backup example from earlier, we can ask: What type of data are we creating and storing? Do we really need this amount of data or data processing? Where exactly is this data being stored, how, and by whom? How can we propose better practices for our data storage? A very interesting and joyful way of trying to trace the location of our data (beyond the fact that we know at least the name of the companies who are doing so from their websites) is demonstrated by Anne Pasek in her *zine* "Get Into Fights With Data Centers" In this piece, Pasek explains the process of *ping*, and how it can be used to find the IP address of certain websites and search for their approximate location, their history, and possible connections with the energy grid where they are located.

It might be worth looking at, and taking seriously, the methods that activist and research groups are using as they experiment with other ways of storing and caring about data infrastructures. In this spirit, I would like to suggest some examples for inspiration, ones that store data locally at smaller scales, whilst remaining efficient. *Low-tech Magazine*[3] – an online journal that takes a critical stance towards new technology development – promotes a "low-tech" approach. This implies refusing the idea that "new technology is inherently better than the one it replaces" and asserts the autonomy of people to choose differently. The article "How and Why I Stopped Buying New Laptops" can give some practical insights into "low-tech" solutions to IT[4].

Their website is also run by a small server that uses solar energy, "which means sometimes it goes offline", challenging the ideal of constant availability. Inspired by this approach, folks at the Ethos Lab – on the 3rd floor of the main building at ITU – also prototyped a solar server in an attempt to decarbonize the lab's website[5]. These examples might seem small, but they are, at the same time, practices of care that address both issues of privacy – by asserting autonomy through local data storage – and questions around climate change – by not using more resources and energy than needed to run a server.



Care practices are often invisible, but they are powerful tools to change our technologies, and hence, our realities. Digital capitalism tends to outsource the care of our data, turning it into a commodity. Having the autonomy to take care of our data is not only an ideological position against the monopoly of Big Tech, but also an ethical approach to social life and the climate emergency.

Next time you save something in the cloud or do a backup, maybe you can think about its potential carbon footprint alongside the privacy related questions associated with these corporations. Might thinking more collectively about your data practices – with your friends, activist groups, universities or companies – help you take better care of it? Go out and try, we dare you!

Felipe Figueiredo
PhD student

2 Availabe on: https://emmlab.info/Resources_page/Data%20Center%20Fights_digital.pdf

3 Available on: https://solar.lowtechmagazine.com/
4 See: https://solar.lowtechmagazine.com/2020/12/how-and-why-i-stopped-buying-new-laptops
5 Source: https://pure.itu.dk/en/publications/a-diy-solar-server-and-the-challenges-and-provocations-of-attempt and http://ethos.itu.dk

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IT UNIVERSITY OF COPENHAGEN

Funded and published by the
Center for Climate IT

With generous support from the
Technologies in Practice (TiP)
research group

IT University of Copenhagen
Rued Langgaards Vej 7
2300 Copenhagen
Denmark

Design and print: Stibo Complete