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# Inventorying data: circumvented investment conditions by Big Tech's supply chain capitalism

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## ABSTRACT

The capital success of multinational tech companies is usually understood to be a result of innovative business models that offer free user access to digital services in return for data. This article shows that besides platformization, the political, economic, and cultural embedding of multinational tech companies depends on the specific ways in which datacenters are established locally. Our ethnographic study of a hyperscale datacenter demonstrates that major local capital investment made it possible for Meta to establish itself as a data producing company in Denmark. Investment conditioned on local political trust in industrial integrity is a process that makes the datacenter a site where data can become a product and thus capital value in the Big Tech supply chain. We theorize this process as inventorying. Implications of the analysis are twofold: First, the concept of inventorying extends the understanding of how data become valuable beyond platformization as it highlights the social, cultural, and political context that continues to enable monopolization of the digital economy. Second, it shows how even a heavily regulated welfare state has few mechanisms to hold big tech companies accountable in terms of their promises of democratic, sustainable, and welfare-political engagements.

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Gifts; digital economy;  
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## Introduction

Big Tech companies have expanded across the globe; however, the means whereby this expansion is simultaneously politically, economically, and culturally embedded have not yet been studied anthropologically. Engagements with people and groups that have become enrolled into Big Tech's expanding operations can help us understand how it is conducted. Peter, a utility worker in the local district heating plant in the city of Odense, Denmark, and one of our research interlocutors, illuminated Meta's theater of mutual benefits accruing from Big Tech's local datacenter construction. He arrived at the meeting room with a stack of documents and a cup of coffee on the day he had promised to introduce energy taxes to the first author. While flipping through a heavy book of extensive paragraphs on Danish energy taxes, he outlined the situation:

Danish District Heating [a form of industry union for municipal and cooperative heating systems] takes care of all our policy interests. We, the utility workers and sector analysts, keep each other informed about how future policies will affect energy utility work. However, the recent policy changes have not come about as a result of the utility's lobby work. Instead, one of the recent policy changes is the elimination of the tax on industrial heat.

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Peter is describing a major political intervention which happened prior to the 2020 Danish Climate Act, and an event that has gone unrecognized in the public sphere. Before building a new datacenter in Odense, Meta bypassed existing public negotiation processes, as datacenter officials were in direct contact with politicians. This resulted in an elimination of the tax on industrial excess heat.<sup>1</sup> From then on Meta was able to distribute the excess heat from their data storage servers freely, rather than – as local industries had done for more than half a century – selling the heat at a low price and paying taxes on the transactions. Meta's involvement in the process was spectacular because it paved the way for the Danish Government's agreement with Google/Alphabet, Facebook/Meta, and Apple to build six new hyperscale datacenters in Denmark in the 2010s.

It is well known that the digital economy is based on the exploitation of humans in producing data about online interactions, clicks, and searches, often referred to as free data, to create an economic surplus. What is less known is that investment conditions for these gifts form the backbone of Big Tech's accumulation of capital value. Research, particularly within and across Media Studies, Information Systems, Political Science, and Science and Technology Studies (STS), has shown that Big Tech companies computationally surveil and manipulate users (Doyuran 2023; Tanninen, Lehtonen, and Ruckenstein 2021; Chun 2021; Viljoen, Goldenfein, and McGuigan 2021; Seaver 2019; Eubanks 2019; Noble 2018; Elder-Vass 2016). Such research connects Big Tech's monopoly on digitalized social life to exploitative data market models (Zuboff 2020) that depend on free labor by users (Ekbja and Nardi 2017; Schwarz 2019; Srnicek 2016). One study in particular outlines how Big Tech's capital success depends on reciprocal relations with platform users (Fourcade and Klutz 2020). Unlike traditional business models that rely on economic transactions within markets, Big Tech's 'accumulation by gift' (ibid.: 1) entails that companies' capital value hinges on free access to services in return for user data.

Big Tech companies penetrate not only social life, but also geographies (Pfotenhauer et al. 2022; Seaver 2021). Platform studies have widely investigated how online platforms have become not merely one component of social life but *the* universal container for relations, activities, and engagements. It was not always like that. The notion of 'the platform' was originally the computer industry's own term to separate its product (the platform, e.g. Windows) from the company (the business, e.g. Microsoft) (Roitman 2023; Plantin et al. 2018), but early software studies showed how the 'undoing' of the separation between platform and business made activities on the platform the business itself (Kelty 2008, 2013; Dourish and Mainwaring 2012). This undoing depended on narratives of freedom made possible by new computing affordances (Velkova 2016a; Gregg 2015; Coleman 2005; Barbrook 1998), the anarcho-capitalism of cryptocurrency (Flood and Robb 2017), and the establishment of the expanding digital capitalism that activists, artists, researchers, politicians, and users are still trying to come to terms with.

Big Tech companies are no longer merely 'internet landlords' but also major scale real estate owners (Greene 2022). An illustration of this pertaining to our research: On the website [www.sustainability.fb.com](http://www.sustainability.fb.com), 'heat recovery' is offered as an example of Meta's datacenter infrastructure engagements at a global scale. It features a world map showing clusters of dots. Next to dots of green that represent wind turbines, yellow that represent solar panels, and blue for water restoration plants, a purple dot represents a datacenter in Odense, Denmark, which directs excess heat into the heating system of a local plant. The website explains how Meta has developed this infrastructure to 'donate the heat [of the servers] to the local community' and thus reduce carbon emissions from the energy system. The 'real estate' Meta shows on its 'sustainability' web site is not only due to Meta's investments in land and the built environment; rather, what we see is the appropriation of existing, publicly owned infrastructure. In 2023, the purple dot showing 'heat recovery' was removed after engineers from the local, publicly owned heating facility found about the advertisement, and Meta no longer advertises the project as a sustainability initiative.

It is not new for datacenters and the energy systems that power them to be exhibited online as an invitation for the public to see 'where the internet lives' (Holt and Vonderau 2014; Hogan 2015).

But what is distinctive about this presentation is that excess heat is used as both a *descriptor* of how a datacenter operates in connection with local energy systems and as a *strategy* for how a tech corporation claims to reduce carbon emissions. In addition, Meta emphasizes its strategy to donate, give freely, and gift not only in terms of platform operations but also via its investments into enabling data storage, analysis, transport: inventory.

In this article we address the following question: How do welfare state actors participate in building a Big Tech world? For insight into the strategic governance of digital supply chains beyond marketing lingo, we focus on one investment for datacenter construction. Drawing specifically on Tsing's research on supply chain capitalism (2009, 2012, 2013), we analyze investment conditions enabling datacenter construction as a process of inventorying in which data, briefly, take form as commodities in the digital supply chain before taking form as data gifts once again. We mobilize ethnographic research at the interface between Meta and a public utility company. The utility company's strategy to phase out fossil fuels through increased use of industrial excess heat such as that from data servers coincided with Meta's plans to build a hyperscale datacenter in the city of Odense, which opened in 2020. Three political and local conditions for new investment emerge in our ethnographic material on this project. We show that the investment conditions of actors with stakes in the site centered around democratic engagement, sustainable production, and welfare returns – and the extent to which they did not materialize. As our article shows, investments in inventorying data do more than enable targeted advertisement and analysis of large language models, both of which are critical to the business model of the digitalized economy. Such investments also secure the inter-relational continuous attachments of welfare state maintenance to Big Tech business model interventions.

### **Inventorying data: capitalization within and beyond markets**

Tech companies typically offer donations to the local communities in which they settle. These gifts can be of all kinds and must be front and center of analysis. The anthropological literature on gifts has documented material exchange processes in diverse locations, typically by categorizing different kinds of gifts: what, how, and when things are exchanged, how they are of mutual benefit, and which actions are expected from the exchanging parties in relationships, eventually turning debts from received gifts into returned gifts (Gregory 2015 [1982]). The literature on gifts simultaneously builds on, speaks to, and challenges notions of freeness and altruism, debating whether gifts are ever really free (Cross 2014; Strathern 2012; Laidlaw 2000). If we look at gifts this way, we begin to understand why they are rarely given anonymously, as they are supposed to make or keep friends and are not necessarily of equal benefit (Piprou 2014; Callon and Latour 2011; Rio 2007; Mauss 2016 [1925]). There are many moments in the life of materials in which gifts are 'more-than', 'never-really', or 'not-yet' a commodity (Graeber 2014).

Tsing (2013) has gone further. She has shown that commodity transactions depend on gifts, meaning that gifts, as social and natural relations exist as something exclusive outside capitalist supply chains, are briefly enrolled into capitalization processes when transformed into commodities. Within supply chains, materials only take commodity form when traveling logistically and are mostly gift-like before and after commodification has taken place. By tying commodification and gift-giving together she argues that gifts as social relations are required for capitalist commodification to take place at all. This aligns with studies showing that the continuously increasing generation of economic value by Big Tech is dependent on intangible goods (Dobeson 2021; Birch and Muniesa 2020). What stands out in Tsing's analysis is the rather liminal process whereby gifts become commodities in 'supply chain capitalism.' This site is *inventory*. In contrast to other forms of capitalist actors, supply chain capitalists are entirely interested in inventory because it is the only time that profit can be extracted from the things they logistically direct from places of extraction to places of consumption.

In contrast, the capitalist forms of exchange that Big Tech companies participate in are usually shown as more distributed than mere supply chains (Neilson and Notley 2019), such as demonstrated in studies of platform capitalism (Srnicke 2016), digital capitalism (Staab 2024), and surveillance capitalism (Zuboff 2020). Yet there are reasons to look at the more benign forms of industrial exchange that undergird Big Tech's territorialization of landscapes and social life alike. In her study, Tsing follows the supply chains of mushrooms that are picked in the US, sorted, transported, and offered as luxury gifts in Japan while remaining materially the same all the way through. Capitalist value is produced from the analyzing, transporting, storing, and directing of gifts that only in this exact moment become commodities. Our example is data. The only time data becomes profitable is when it is stored, analyzed, and transported in the inventory of datacenters. All things mutate into different forms within both use and exchange practices and are given economic value by humans, whether as commodities, gifts, assets, or singularities (Braun, Brill, and Dobeson 2021). This recent finding in economic anthropology on mutability turns the study of economic value-making on its head by not emphasizing the difference between economies such as gift economies and commodity-based economies, which has been a common topic, particularly in anthropology. It shows instead how different forms of exchange and the mutability of things take place within and across economies (Asdal and Cointe 2021; Braun 2021; Brill 2021; Dobeson 2021; Tsing 2009).

The literature on datacenters has already shown how social relations, material extractions, and investment politics are making major scale computing possible. For example, the labor necessary for building and retrofitting datacenters is inflicted with masculinized taboos of low efficiency and imaginaries of automating and 'depeopling' server work (Gonzalez Monserrate 2023; Au 2022; Munn 2021; Hogan and Vonderau 2019; Taylor 2019; Holt and Vonderau 2014), while rare earths are transported within their own additional supply chains after violent extraction, both socially and environmentally, in the Global South (Cooper 2021; Taffel 2023). After rare earths have been utilized in building components to store and analyze data, datacenters go on to consume increasing amounts of energy and water, which tech companies often try to counteract by accessing renewable energy and transferring excess heat to local energy systems (Salling 2024; Pasek, Vaughan, and Starosielski 2023; Childs 2022; Bresnihan and Brodie 2021; Velkova 2021, 2016b). Locations with higher amounts of renewable energy within their electricity grids often become involved in both state and municipality revival projects attracting datacenter operators (Pan 2022; Vonderau 2019; Maguire and Winthereik 2019). In this vein, Burrell (2020) analyzed how another Meta datacenter, this one in Oregon, USA, was mobilized within local debates on realizing regional economic development. Datacenters, particularly hyperscale datacenters, are highly political projects. Critical datacenter studies have demonstrated that datacenters are more than warehouses for data but also depend on a variety of other forms of supply, extraction, and negotiation (Hogan, Edwards, and Cooper 2022). The transfer of data transcends simple, linear chains, enabling new forms of connectivity across space and time (Neilson and Notley 2019). In contrast, data inventories mark a site located within Big Tech's supply chains to which large-scale investments are transferred. This makes the data center a liminal space in which data inventorying can realize Big Tech's and similar companies' aspirations for continuous, expanding capitalization upon social and natural, uncaptialized relations.

### **The site: utility and industry connections**

In the 2010s, before the materialization of any hyperscale datacenters in Denmark, a new government office of the Danish Foreign Ministry – 'Invest in Denmark' – invited Apple, Google, Microsoft, and Meta to consider what was needed in terms of placing new datacenters in Danish municipalities. In Odense (Meta datacenter) and Viborg (Apple datacenter) local politicians claimed that thousands of jobs would become available with the arrival of Big Tech's datacenters (Oehlenschläger and Tranberg 2023). This strategy of arranged marriage was successful in the sense that many municipalities took preliminary steps, such as providing possible locations and



**Image 1.** The Meta datacenter in Odense, Denmark, in November 2020.

changing city plans, in order to welcome prospective datacenter construction projects (Maguire and Winthereik 2019). In 2016, Meta and local partners in the city of Odense, including the municipality selling the land, signed an agreement involving 100 million DKK, according to public report, or approximately 15 million USD (Image 1).

Yet there are several reasons why this exact location interested the Meta officials. All Danish cities have large, publicly owned heating systems, referred to as ‘district heating’. These systems were originally built in the first half of the twentieth century to use excess heat from electricity generation to heat nearby residential buildings, swimming pools, and schools, but eventually grew to service most areas of the larger cities with the supply from fuels burned only for the heating systems. They were largely extended out of the cities in the 1970s to replace households’ individual consumption of oil more broadly, as the oil crisis spurred regulation to secure a more efficient use of fossil fuels (Caussarieu 2021). Danish industries that produce cement, butter cookies, and tin cans have for more than half a century sold excess heat from their factories to supply local heating infrastructures with energy, and energy analysts and scholars work hard to use more of this kind of heat as a substitute for fossil fuels. In 1995, a tax law on excess heat was passed to ensure that industries would not use more energy than necessary in order to sell excess heat to district heating utilities. In 2021, 3% of the district heating in Denmark came from excess heat from industrial production, while district heating systems supplied, on average, two out of three buildings with heat.

Keeping this heating system up and running while transforming it for the decarbonized society is the task of the Odense heating system’s utility workers among whom the ethnography was conducted. This mainly took the form of participant observation and interviews by the first author over the course of two months in 2020, with follow up interviews. This ethnographic material was then supplemented by additional empirical material generated via snowballing from the utility workers’ experiences and contacts, including interviews with tax officials and civil servants in the energy sector, as well as document analysis of websites, sustainability reports, and public commentary on the datacenter projects. During fieldwork, the research focused on the daily activities of the utility workers in planning and building the convergence of existing sources of fuel and excess heat produced by the datacenter; this consisted of meetings, site visits, in situ discussions, fixing and maintaining technologies on site, and lunch conversations. The utility workers were very generous, welcoming and eager to explain what they were doing.

As several interlocutors pointed out the relevance of energy and climate policy to their daily work, fieldnotes and photographic documentation were supplemented by analysis of reports,



white papers, news articles, and legal documents. These were given to the first author during the time she spent among the utility workers – indicating a strong interest in the regulative framework among many of them – and substantiated by conversations about Meta’s lobby work. She then analyzed the ethnographic material, consisting of fieldnotes, recordings, documents, photos, and websites, and found that a large part of the data indicated how gift-giving processes facilitate the emerging connections between welfare state infrastructures and Big Tech infrastructures. Analytically, she explored and thematized reciprocal relations facilitating the gift-giving, with findings demonstrating that three clusters of promises enabled datacenter construction to take place. As the utility workers frequently highlighted the impactful actions of politicians, tracing policy changes and the promises made to politicians became a priority in fieldwork, because it emerged that the utility workers’ tasks were very much defined by *how* to use the excess heat from the datacenter rather than *whether* and *to what extent* it would thermodynamically make sense to use it.

When ‘Invest in Denmark’ started its work to attract Big Tech’s datacenter constructions in the mid-2010s, informal agreements with new business establishments were based on expectations that these industries would engage democratically, operate sustainably, and contribute to the production of welfare revenue, like other industries settled in sites within the borders of the nation-state. In the following we explore these conditions for Big Tech’s investment via ethnography in and around the Meta Odense datacenter and publicly owned district heating. This finding leads to our analytical point that Big Tech benefits from such informal investment conditions with regard to localized sites yet does not necessarily need to materialize the promises to live up to the conditions in order to capitalize on the sites as data production facilities or, in other words, inventory. As we show in the following analysis, inventorying as a process unfolds from capital-seeking actors making promises, pledges, and statements to meet conditions made by local infrastructure owners, operators, and legislators intended to ensure that they contribute to the local socio-natural environment in which infrastructures operate.

## Investment conditions for datacenter construction

### *First investment condition: democratic engagement*

‘Electrification is the future for all energy producing and consuming systems’, the first author was told repeatedly whilst spending time with the utility workers planning and calculating the future of district heating in Odense. Peter, who has worked on energy taxes for many years, emphasized this point, among many others. He was keen to talk about how taxes on excess heat in their daily work, especially when planning the district heating infrastructure, as new climate policy had pushed for more electrification of heating in order to phase out fossil fuels.

Since 2019, the Danish Parliament has initiated a number of new areas of legislation within the Climate Agreement on Energy and Industry.<sup>2</sup> Among these, Green Heating for Danes promoted the diversion of hot air from industries into district heating systems all over Denmark. The agreement emphasizes that the collective model of district heating, which has ensured stable energy provision for many decades, must be provided through ‘sector coupling.’ The Danish sub-ministerial Energy Agency was tasked with handling the practicalities of the 2020 climate policy (such as tax elimination), including enforcing an energy efficiency scheme in which companies can be certified, thereby becoming fully exempt from paying tax on excess heat. In the policy documents, this is presented as a simplification and, indeed, also a full elimination of the tax since all industries can get certified by following the energy efficiency recommendations within the scheme. Ultimately, the change in the tax policy came from the desire to decarbonize industries and energy systems. Accordingly, district heating systems would now have to produce not only the same amount of energy but also extend the systems to lower carbon emissions.

Aligning district heating operations with policy goals, however, requires considerable expertise. ‘Before the excess heat tax was eliminated and replaced with a certification scheme in the climate

| Oversigt over love                                                                |      |
|-----------------------------------------------------------------------------------|------|
| Affalds- og Råstofafgiftsloven<br>Lovbekendtgørelse 2011-04-01 nr. 311 .....      | 1    |
| Akkumulatorafgiftsloven<br>Lovbekendtgørelse 2006-12-06 nr. 1251 .....            | 15   |
| Ansvarsforsikringsafgiftsloven<br>Lovbekendtgørelse 2007-03-12 nr. 216 .....      | 21   |
| Bekæmpelsesmiddelafgiftsloven<br>Lovbekendtgørelse 2008-01-30 nr. 87 .....        | 29   |
| Brændstofafgiftsloven<br>Lovbekendtgørelse 2014-01-16 nr. 40 .....                | 48   |
| CFC-afgiftsloven<br>Lovbekendtgørelse 2007-06-11 nr. 599 .....                    | 62   |
| Chokoladeafgiftsloven<br>Lovbekendtgørelse 2013-06-10 nr. 752 .....               | 73   |
| Elektricitetsafgiftsloven<br>Lovbekendtgørelse 2011-04-01 nr. 310 .....           | 93   |
| Emballageafgiftsloven<br>Lovbekendtgørelse 2014-09-15 nr. 1071 .....              | 134  |
| Førbudsafgiftsloven<br>Lovbekendtgørelse 2008-01-29 nr. 56 .....                  | 170  |
| Fosforafgiftsloven<br>Lovbekendtgørelse 2014-09-25 nr. 1142 .....                 | 180  |
| Fremskyndet tilbagebetalingsloven<br>Lovbekendtgørelse 1998-09-15 nr. 675 .....   | 185  |
| Gasafgiftsloven<br>Lovbekendtgørelse 2011-04-01 nr. 312 .....                     | 190  |
| Klorerede opløsningsmidler<br>Lovbekendtgørelse 2006-12-06 nr. 1252 .....         | 218  |
| Konsumsifgiftsloven<br>Lovbekendtgørelse 2012-01-31 nr. 115 .....                 | 223  |
| Kulafgiftsloven<br>Lovbekendtgørelse 2014-09-09 nr. 1070 .....                    | 228  |
| Kuldiisafgiftsloven<br>Lovbekendtgørelse 2011-04-04 nr. 321 .....                 | 261  |
| Kvælstofafgiftsloven<br>Lovbekendtgørelse 2013-08-22 nr. 1034 .....               | 296  |
| Kvælstofoxidafgiftsloven<br>Lovbekendtgørelse 2013-08-26 nr. 1072 .....           | 302  |
| Lastbilsilskudsloven<br>Lov 2000-12-20 nr. 1302 .....                             | 315  |
| Lystfartøjsforsikringsafgiftsloven<br>Lovbekendtgørelse 2005-11-10 nr. 1082 ..... | 316  |
| Lønsumsafgiftsloven<br>Lovbekendtgørelse 2013-08-31 nr. 1079 .....                | 321  |
| Mineralolieafgiftsloven<br>Lovbekendtgørelse 2014-09-26 nr. 1118 .....            | 357  |
| Momsloven<br>Lovbekendtgørelse 2013-01-23 nr. 106 .....                           | 436  |
| Narkotikaprákursloven<br>Lov 2005-05-18 nr. 326 .....                             | 1055 |
| Opkrævningsloven<br>Lovbekendtgørelse 2014-05-28 nr. 569 .....                    | 1057 |
| PVC-afgiftsloven<br>Lovbekendtgørelse 2007-03-19 nr. 253 .....                    | 1130 |
| Registreringsafgiftsloven<br>Lovbekendtgørelse 2014-01-10 nr. 29 .....            | 1138 |
| Reklameafgiftsloven<br>Lov 2012-12-18 nr. 1228 .....                              | 1224 |
| Skadesforsikringsafgiftsloven<br>Lov 2012-06-18 nr. 551 .....                     | 1227 |
| Skatteforvaltningsloven<br>Lovbekendtgørelse 2011-02-23 nr. 175 .....             | 1241 |
| Spilleafgiftsloven<br>Lov 2010-06-25 nr. 698 .....                                | 1494 |
| Spildevandsafgiftsloven<br>Lovbekendtgørelse 2013-06-27 nr. 938 .....             | 1507 |
| Spilleloven<br>Lov 2010-07-01 nr. 848 .....                                       | 1517 |
| Spiritusafgiftsloven<br>Lovbekendtgørelse 2007-10-22 nr. 1239 .....               | 1556 |
| Svovlafgiftsloven<br>Lovbekendtgørelse 2006-02-08 nr. 78 .....                    | 1584 |
| Tinglysningsafgiftsloven<br>Lovbekendtgørelse 2007-05-14 nr. 462 .....            | 1601 |
| Tobaksafgiftsloven<br>Lovbekendtgørelse 2014-04-01 nr. 379 .....                  | 1643 |
| Toldloven<br>Lovbekendtgørelse 2005-09-13 nr. 867 .....                           | 1663 |
| Vandafgiftsloven<br>Lovbekendtgørelse 2013-06-27 nr. 962 .....                    | 1768 |
| Varemærkeforfalskningsloven<br>Lovbekendtgørelse 2005-10-20 nr. 1047 .....        | 1775 |
| Vejafgiftsloven<br>Lovbekendtgørelse 2011-08-15 nr. 896 .....                     | 1778 |
| Vægtafgiftsloven<br>Lovbekendtgørelse 2014-02-18 nr. 185 .....                    | 1784 |
| Vækstfremmerafgiftsloven<br>Lov 1998-06-26 nr. 416 .....                          | 1814 |
| Øl- og vinafgiftsloven<br>Lovbekendtgørelse 2013-08-26 nr. 1062 .....             | 1819 |

**Image 2.** A handbook on Danish tax law highlighting the areas relevant to the heating utility.

agreement policy, it had its own section in the tax law', Peter said. The law on excess heat was also part of the coal tax law, the gas tax law, the mineral oil tax law, and the electricity tax law. As we started to investigate the more than 1,000-page-long handbook of tax laws that he brought to our scheduled meet-up, he laughed at the strangeness of someone showing interest in this stuff: not only is district heating usually perceived as boring infrastructural work but how much more so the tax law! (Image 2)

The workers employed by the district heating utility often participate in formal public hearings on new regulations, such as the eliminated tax on excess heat which Peter was responsible for presenting at the hearing process.<sup>3</sup> He clarified that this kind of work belongs to what they classify as 'lobby work.' When the Danish parliament announces a public hearing for a new policy, district heating companies are invited to participate in lobby work along with many other companies, organizations, and formal groups that might have an interest in or important concerns with the new policy.

However, as Peter mentioned, Meta's lobby work took place *before* the changed energy policy was formulated in the new Climate Act, rather than as the result of a public hearing. 'Obviously,



that is not something we can see in the text anywhere,’ he said, after which he explained the plethora of examples of undocumented lobby work in the manuals of tax law. For example, he continued, ‘in many instances it is quite clear but unstated which agricultural company has influenced which tax law on farming.’ The consequence is that it is impossible to fully trace the steps Meta took to secure the elimination of the tax. By making this post-hearing process form of lobby work clear, Peter also indicated Meta’s role in the changed regulation on excess heat. His remarks on the tax made it clear to us that there could be no tax on the commodity of excess heat if Meta were to formally transform it into a gift, which was the corporation’s wish from the early negotiation stages.

The engineers and the managers of the district heating utility must accept the public hearing format as the only channel for their lobby work. Peter’s remarks show, however, that differences in the scale of organizational power afford differences in the scale of policy impact. Peter did not know who was taking part in mediating Meta’s wish of changed policy. But the informalized, non-transparent, and behind-closed-doors choice of lobby impact stood in stark contrast to the pledges and statements whereby the public had come to know Meta, exemplified perhaps by Mark Zuckerberg’s statement in 2012 emphasizing Facebook’s mission: ‘Facebook was not originally created to be a company. It was built to accomplish a social mission – to make the world more open and connected.’<sup>74</sup> Yet participating democratically by openly working for its own company interests was a promise that Meta eventually did not fulfill. As Peter highlighted, this is not uncommon. Yet the engagements were evident in Meta’s successful *informal lobby work* that took place prior to policy development as a result of direct contact with politicians behind closed doors. Whereas, in contrast, the utility’s *formal lobby work* could only take place in the public process of hearings that respond to already suggested policy.

Sovacool, Upham, and Monyei (2022) note that one of the reasons for building datacenters in the Nordic countries is to take advantage of ‘policy boosts including tax cuts for datacenters.’ Their argument about tax cuts underlines the extent to which de-taxation is used as a governance tool in attracting datacenter operators into national territory and, therefore, national markets, which results in various kinds of integrations with energy systems (Bresnihan and Brodie 2021). This is also the case for Meta in Denmark, except that the eliminated tax on excess heat complicated matters. Rather than triggering conventional attempts to avoid general corporate tax, market transactions involving industrial excess heat were to be replaced with free delivery, making a reportable gift of server air, thus aiding efforts to decommodify Meta’s operations to the extent that data production would only take commodity form inside the data inventorying datacenter. Additionally, Meta itself, through relations and meetings with Danish politicians, pushed for intervention into tax policy that would allow realizing its ambitions to expand its data content via extended and expanding built environments for data storage, sorting and analysis.

### **Second investment condition: sustainable production**

The engineers of the district heating utility had recently installed many large heat pumps to increase the server air temperature sufficiently to meet the requirements of the local system. These were positioned next to the datacenter but also in other locations including the central energy plant, which for decades has been fueled with materials such as coal, straw, and municipal garbage. The heat pumps can be used for many different kinds of excess heat, including hot air from the burning of household waste, and heat from the wastewater of the nearby waterworks facility. However, Peter mentioned that, legally, excess heat is not the same if sold by an external industry or simply used from one of their own garbage incineration boilers. As noted above, excess heat from industries in the past has been sold and, therefore, also taxed to ensure no overproduction, and therefore no overuse of fuels. With reference to the electricity tax and the excess heat tax, he commented that the parliament is also changing the taxes because the grid is receiving more electricity from wind turbines. He ended his walk-through of tax history with the conclusion that this policy is certainly



**Image 3.** One of the new heat pumps that transform datacenter air into district heating.

regulating their behavior as an energy utility, requiring them to change their facilities in Odense, integrate with Meta, and install all these new heat pumps, needed because the server heat is not warm enough for the heating system (Image 3).

It is only the electricity powering the heat pumps that is currently supplied by the Meta corporation through its confidential contract with the grid operator. Although, '[s]hould Facebook pull out, the facilities can be used for another form of electrified district heating production,' Peter said reassuringly. Even so, the architect-designed building containing the state-of-the-art heat pumps was a large investment out of the district heating company's own budget. Meanwhile, the electrification momentum enabled Meta to establish direct relations with Danish politicians on energy policy matters. Using the server air for district heating is advertised as one way the Meta corporation is involved with local efforts contributing to what are commonly referred to in industrial lingo as 'sustainability initiatives', an involvement which many Northern European municipalities and states highlight as an expectation when deciding to host datacenter construction (Libertson, Velkova, and Palm 2021; Vonderau 2019).

On a tour of the heat pump facilities, another engineer, Jens, remarked with a grin that the excess heat from the servers is more lukewarm than hot: a production project rather than something ready-to-be-used, as the server air temperature was only half as that of the district heating water. In 2017, the municipality-owned district heating organization decided to invest in 24 MW of heat pumps in order to use Meta's excess air, and in 2019 an additional investment in 20 MW of heat pumps was made, which included the large new building for housing the pumps immediately adjacent to the datacenter. 'Thermo-politically' (Velkova 2021), the datacenter certainly makes an air castle of unfulfilled promises in more than just one way: it makes a million-dollar home for the lukewarm air exhausted from servers and redirected to ensure as few as possible server crashes. Peter's account of the tax on excess heat shows how the eliminated tax exemplifies Meta's unfulfilled democratic pledges, while, in contrast, Jens' insights document a promise in relation to a sustainable transformation of energy consumption from datacenter operations to public energy production. The changed policy written into the climate agreement has been successful in incentivizing the convergence between the datacenter and heating systems, with the use of the server heat enabling electrification of the system – the major contemporary energy policy trend for decarbonization. But if the district heating utility is fueling the heat pumps, how will they be remunerated for their efforts?

Meta has offered to supply the electricity that the heat pumps use, in combination with its own electricity supply contract for the datacenter. On Meta's sustainability website and on posters placed inside the new district heating facilities, the corporation advertises the use of 100% renewables from two wind turbine farms in Norway to fuel both the datacenter and the heat pumps. It works like this: Meta has entered 'corporate power purchase agreements' (CPPAs) whereby it purchases wind turbine construction through an external asset management firm. The wind turbines are added to the Nordic grid, which also supplies the city of Odense. The promise of the datacenter's sustainable consumption is exchanged for expectations of materialized sustainable transformation of the electricity grid. In this enacted investment condition, the representation of energetic transactions does not support the image that Meta has worked to build. This is an image in which the datacenter is directly serviced by wind turbines – only supplied by wind energy – rather than the coal, oil, gas, garbage, nuclear, hydro, and wood-fired energy plants of the connected, transnational grid that produce electricity when the wind does not blow enough. This model is an actual graphic figure produced by Meta that was printed on a poster hanging in the utility's new heat pump building as well as being used on its datacenter sustainability website. In this official graphic figure (which we cannot reuse in the article for copyright reasons), the datacenter is placed between two wind turbines that plug directly into the datacenter facilities.

When the news of the wind energy projects in Norway became public in 2019, the only problem discussed in media outlets was how the electricity produced in Norway but used in Denmark would look bad in what was referred to as Danish 'climate accounting' in terms of living up to geopoliticized climate goals. The Minister for Energy, Utilities, and Climate rejected this problematization and accepted the financial energy compensation: 'It is good for the climate worldwide, and the climate does not care where the wind turbines are constructed.'<sup>5</sup> After the government's formal acceptance of financial compensation via the constructed wind turbines, Meta went on to advertise that its datacenter in Odense is 'carbon neutral.'

In that sense, the effects of the amounts of electricity consumed by the Meta servers are made intangible through accounting instruments. Moreover, the financial agreement enables Meta to pay the same secure and set electricity price for more than a decade, in contrast to all the household energy consumers in the country who, since 2019, have received increasing bills for everyday subsistence use. This could be viewed as external to the activities of the datacenter operators, but a report published in 2022 by the network, the Danish Datacenter Industry, on the use of excess heat, points elsewhere: 'This [heat recovery] provides optimal conditions for datacenters to become a natural and important part of the heat supply in the district system, directly contributing to more sustainability, achieving greater CO<sub>2</sub> reductions.'<sup>6</sup> As the datacenter and public heat production connections are structured for full integration, the actual energy and emissions impact of the digital

economy is hidden behind a shower of potential sustainability benefits, not yet received by energy users, producers, or by anyone whose life conditions are vulnerable to climate change induced by increasing energy consumption.

It took many months of construction work, trial phases, and the major financial outlay of employing external constructors, architects, and energy analysts to make the server heat useful to the district heating of the city. New climate policies calling for the electrification of all energetic processes state that any available excess heat from industrial production must be put to greater use in the future. Yet this excess heat from the Meta datacenter is not just there, available, and ready to be used; rather, it is the product of considerable electricity generation and utility work eventually, in the form of inventory, connecting data to existing infrastructure, resourcified materials such as fuels, and publicly paid manual and engineering labor.

### **Third investment condition: welfare returns**

Historically, technology industries have been deeply embedded in both the construction and the continuation of welfare provisioning conducted within welfare economies (Pedersen 2018). ‘Welfare’ has changed since the 1990s with the transformation of the self-sustaining welfare state, as increased global economic competition has become a means for creating the new welfare state built on the pillars of industrial, corporate tax (Pedersen 2018). More than ever before, welfare state politicians are positioning industries as welfare suppliers through job creation and tax payments. In this vein, many government ministers are smitten with the ‘hype of economic gains from digital transformation’ (Hockenhull and Cohn 2021) and are keen to implement ‘public disruption’ (Collington 2022) and ‘the fourth industrial revolution’ (Schiølin 2020), and, as in Denmark, venture into formal partnerships with Microsoft on public AI strategies.

To pave the way for Meta’s datacenter expansion, a report commissioned by the corporation itself was published by the industrial analysis company, IHS Markit, in 2019. The report focused on the ‘economic contribution’ of Meta’s three datacenters in the European Union and offered quantitative analysis of various parameters based on numbers delivered by Meta itself. These included purchased equipment, wages, construction work, and models that abstractly showed capital flows between units to highlight the part played in the Danish GDP by estimated increases in spending by local employees and overall expenditure. The report is presumptuous enough to suggest an estimated GDP contribution and economic gain as a result of everyday purchases by its local employees in Odense, although there were not half as many as promised when the datacenter deal was signed and some of these had worked for the publicly owned district heating utility before Meta offered them a higher wage at the new datacenter.

GDP metrics are always partial and limited and do not reflect reality in itself but, rather, a selective, economized quantification of human life (Murphy 2017). Highlighting anticipated yet undocumented GDP contributions demonstrates the expected strategies of politicians and how Meta hopes to cater to them, thereby sustaining their mandate for inventorying in Odense. However, the Danish authorities were convinced by Meta’s case. Odense’s mayor approved the news of the final agreement with the statement, ‘To me this is the large happy smiley and thumbs up because this really is an important turning point, and I see enormous prospects for the city.’<sup>7</sup> Similarly, on the datacenter’s opening day in 2019, the Danish Minister for Energy, Utilities, and Climate commented on his appearance at the event with a post that could lead readers into thinking that a number of new wind turbines built in Odense had something to do with Meta: ‘Busy day in Odense. The opening of Facebook’s green datacenter and visiting the harbor with the new wind turbines!’ (Translation by the authors from a Danish news article). The post included four photos, including one of a wind turbine, and in the first he winks in front of a wall plastered with the Facebook logo while his index finger, positioned next to his head, confidently points upwards.

Studies of the digital economy have shown that Big Tech are intervening in critical welfare-provisioning infrastructures, also beyond the US (such as in health care, education, law enforcement,

and energy) (Phan et al. 2022; Birch and Bronson 2022; Hendrikse et al. 2022; Maguire and Winthereik 2019; Sadowski 2019). Additionally, Scandinavian welfare states are increasingly encouraging the convergence of public and corporate infrastructures, thereby outsourcing key welfare tasks while claiming to produce economic value through increased efficiency and competition (Salamon, Lex, and Friberg 2016). This form of managerial strategy by national governance can be described as ‘inter-urban competition’, which normalizes the momentum of entrepreneurialism by pitting city managements against each other to win the favors of large industries (Harvey 1989). Civil servants’ expectations of economic trickle-down impact, and municipal politicians’ hopes for advantageous economic ripple effects in both cities and small communities, are a common entry point for major corporations wishing to establish themselves in locations like Odense (Dale 2019; Reinert 2018).

In addition to enrolling politicians in claims to provide new employment opportunities, renewable energy construction, and compensation, the Meta corporation characterizes its local efforts in Odense in terms of investments by construction but also investment by donations. Meta particularly advertises the Community Action Grants Program, which has donated large sums of money to entities including the local Save the Children group, a hacker space, VR headsets for local schools, public schools’ STEM education, and an NGO arranging activities to get more schoolgirls interested in engineering. In 2020 alone, the first year the datacenter was operating, 190,000 USD was donated to these and similar public institutions and NGOs in Odense, and each year the grant application reopens for new donations. Applicants are guided in webinars on how to apply for funding. ‘We are happy to have a positive impact on society’, the datacenter manager answered when asked about the grant program by a local newspaper.

This program exemplifies a charity form in which donations are made to groups that are estimated to be in need of assistance and, importantly, businesses which are strategically smart to support (McGoey 2021). The donations targeting schools and tech extracurricular activities are not accidental. Compared to historical forms of philanthropy, tech philanthropy is novel in that the corporations involved concurrently assert their own digital expertise and products to create societal impact and secure users for the future (Henriksen and Richey 2022). Big Tech companies have designed new digital initiatives intended to ‘do social good’ meanwhile reconfiguring ‘doing good’ as both datafied and profitable, and often taking more away than it gives (Magalhães and Couldry 2021). Indeed, transnational donations have for decades been a well-used business model by tech corporations, as even small sums can have political impact because when such support becomes normalized, sudden withdrawal or failure can be devastating (McGoey 2016). It is relevant in this context that large, strategically selected donations are engineered to do the work of redistribution that in welfare economic terms is usually the responsibility of municipalities and nation-states.

However, Big Tech-driven redistribution of welfare takes a different ideological route than that advanced by a sitting government or city council, and it is not democratically sanctioned. If companies and foundations constructed on the basis of company profit donate enough to targeted projects, institutions, or organizations, then the allocated public budget does not have to be spent (the argument goes) and can be used elsewhere. But, in practice, as a result of corporation donations public budgets are usually cut instead of redirected (McGoey 2016). The donations in Odense fund educational activities that the local municipality is officially responsible for managing and budgeting; Meta, however, intervenes in that due to acceptance of the contributions by both national and local politicians – with many ‘happy smileys.’

Odense’s schoolgirls might be less critical of Meta than most other citizens due to the success of the local donations in augmenting coding training and VR headsets. That does not, however, result in establishing a direct line of reciprocity. In the strategic framework of these businesses and the politicians themselves, materials gifted to schools and students – like the heat directed to the local heating utility – are all numbers in economic calculations; they benefit the companies rather than by requirement the citizens or utility companies, despite being presented as providing welfare by industrial economic means such as funding and employing.



In other locations in Denmark, similar implications in the promises of Big Tech became apparent: two Danish city council politicians in Viborg made a public statement in 2021 concluding that the Apple datacenter, built a few years before, did not live up to their expectations. The promise of 10,000 jobs seemed extraordinary when one of them commented ‘even 1,000 jobs seem impossible at this stage.’<sup>8</sup> These events, connected with Big Tech’s datacenters in Denmark, showcase the extent to which inventorying is a process that requires not only the use and work of businesses’ own operations but is also contingent on the localized political, economic, and cultural engagement with, and enablement of industrial operators in search of favorable and unproblematic new inventory sites.

## Conclusion

In 2022, the IT news outlet Computerworld reported to its Danish readers that the Odense Meta datacenter had reached a turnover of 3 billion DKK, approximately 443 million USD. Meta’s daughter company, ‘Meta International Operations’, based in Dublin, owns yet another daughter company, ‘Cassin Networks’, which owns the datacenter in Odense. Meta itself reports the necessity, via its datacenter website, for investment in new and more datacenter infrastructure; therefore, the infrastructuring of data profit is an issue that requires analytical attention. Studies have shown that Big Tech’s business model depends on reciprocity between companies and users through the exchange of two gifts – data and platform services – meaning that its success is often reduced to the limitless extraction of data due to users’ engagement with free platform services. But that is not all.

In recent years, a variety of academic disciplines have attended to the question of what is new about the business models of twenty-first-century information technology companies. Legal scholarship addresses whether monopolized datafication is causing ‘the end of markets’ based on an argument comparing data to historically ruling commodities such as gold and oil: ‘[t]he worth of data does not lie in their exchange value but in the power, they confer on data controllers’ (Pistor 2023). A reading of the concept of exchange through Tsing’s analysis of supply chain capitalism (2009) gives us another perspective: specifically, on transactions that do not only place economic value at the center of exchange yet still become economically valuable. Such a reading attends to the production of reciprocity, which at times can be skillfully used in displacing economic value production to new sites rather than at the more accessibly appearing center of relation-making. Data transactions are yet another form of exchange, in comparison to other and historical ones, in which both power and value-making are folded into local practices and infrastructures in surprising ways. It is the non-capitalized parts of such practices and infrastructures that we can see with the perspective of inventorying are crucial to datacenters making data commodities.

Our ethnography of local datacenter investments in Denmark demonstrates that Big Tech’s continued expansion is dependent on infrastructure work beyond platform construction and maintenance. The work of connecting an energy system to a datacenter can provide a window into a whole range of interactions and exchanges going on between Big Tech and localized organizations. Conditions for the datacenter investment were centered around localized requirements and cultural norms. These include: 1) democratic engagement, thereby engaging with policy change in parity with other companies and organizations operating in Denmark. Eventually, Meta initiated lobby work to influence Danish climate policy before the public hearing process at which, simultaneously, the utility workers could only democratically engage with policy suggestions. 2) Sustainable production, by living up to their own strategies claiming 100% renewable electricity supply and efforts in which the company itself would ensure sustainable transition of its datacenter operations. However, utilizing excess heat from Meta’s servers became a job that was the accomplishment of the local, municipality-owned heating utility. This work also required ensuring that lukewarm server air was heated to the correct temperature for the local heating system. In addition, Meta consistently advertised its investments in renewable energy as serving its Odense datacenter directly, although it was ensured via a Corporate Power Purchase Agreement adding to the Northern European grid. 3)

Welfare returns, in which both local and national economies would benefit fiscally from the data-center investment in the form of new employment opportunities. Meta eventually hired only a fraction of the promised employees, while several were headhunted for a higher salary from local, public jobs such as in the utility. Meta has also rolled its Community Action Program out in Odense, as it has in most other datacenter locations around the world. This program distributes donations to local, public organizations and NGOs such as schools via Meta's own selective redistribution mechanisms rather than via public, governed welfare services.

We explored these three examples of investment conditions that were never realized to exemplify how datacenter investments enable the inventorying of data crucial to the business model of major tech companies. Data inventorying produces sites in which data can be grasped as the commodities of capital value that they are. The digital economy is not inherently a gift economy, but it depends on, and structures gifts in certain ways, like all economies. In other words, investment in continuous datacenter construction is necessary for the multinationalized, hyperscale capitalization of our social and natural lives. In order to react to that critical issue, we can attend to how inventory is the transporting, analyzing, directing, sorting, and storing of data that makes it an economical, yet not-only economic, process. The data inventory displays how the digital economy is also an exemplar of supply chain capitalism, specifically as tech companies have developed business models that fully rely on social relations, not just at platform but also at local infrastructure level. Moreover, inventorying as a process exhibits the political, cultural and economic embedding that is necessary for the data inventory to be built, managed, and maintained.

Finally, Big Tech is, beyond platformization, transforming the kinds of industrial capitalism that have been formulated in and supported by decades of welfare policy, and the governance instruments that are used in this endeavor are similarly applied to energy and policy systems. Thus, attention must be paid to who enables whose agenda, and who are the few that actually get something out of Big Tech's promises – if they materialize at all. With this study we have demonstrated that only a few of the conditions attached to a local hyperscale Meta datacenter investment eventually materialized. While some transformation of energy production and consumption, and a measure of job creation came to fruition, these benefits were far from comparable with the investment conditions. Indeed, Meta stands to benefit greatly from datacenter operation in relation to sustainability reporting, energy and lobby access and control, land acquisition, and local support. As Fourcade and Klutetz (2020) argue, policy interventions in the digital economy have ironically only attended to market mechanisms rather than the data gift economy. Such projects have failed because they have failed to attend to Big Tech's model of capitalization itself. However, there are no known mechanisms developed to guide and instruct transactions corresponding with justice in formalized gift economies. The limitation of this argument, we argue, is that the liminal and culturally condensed site in which data capitalization takes place is often ignored. Successful political and social change will necessarily intervene in the digitalized economy, and not just via platform interactions but, rather, via the digital supply chains and their data inventories enabled by large-scale, continued datacenter investments in hyperscale construction complexes. And to the wealth of scholars who show the need for policy interventions into Big Tech's monopoly over platformized social life: look to the landscape – the not-yet digitalized spaces and the data industrialized sites – that in fact do produce data by inventorying social and natural life into data capital.

## Notes

1. Facebook Inc. was the name of the umbrella company before it was changed to Meta Platforms Inc.
2. In this policy text, excess heat is referred to as 'surplus heat' but in most policy, academic, and white papers this form of heat is titled 'excess heat.'
3. According to the official statement of the Danish parliament, the following defines a public hearing in Denmark: 'Ministries send law drafts for hearing before processing in the parliament through which affected associations, organizations, communities, etc., are asked to give written feedback (hearing answers) on the bill' (translated by the authors). <https://www.ft.dk/da/leksikon/hoering> (accessed September 25, 2024)

4. <https://www.theguardian.com/technology/2012/feb/01/facebook-letter-mark-zuckerberg-text> (accessed September 25, 2024)
5. <https://www.altinget.dk/artikel/facebook-bygger-datacenter-i-danmark-men-vindmoeller-i-norge-klimaet-er-jo-ligeglad> (accessed September 25, 2024)
6. <https://www.datacenterindustrien.dk/knowledge-hub> (accessed September 25, 2024)
7. <https://www.dr.dk/nyheder/penge/odense-borgmester-om-facebook-nyhed-happy-smiley-og-thumbs> (translation by the authors from interview part of a news article, accessed September 25, 2024)
8. <https://www.computerworld.dk/art/257797/viborg-vi-har-ikke-faaet-det-ud-af-apples-datacenter-som-vi-havde-forventet> (accessed September 25, 2024)

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## References

- Asdal, Kristin, and Béatrice Cointe. 2021. "Experiments in Co-Modification: A Relational Take on the Becoming of Commodities and the Making of Market Value." *Journal of Cultural Economy* 14 (3): 280–292. <https://doi.org/10.1080/17530350.2020.1846592>.
- Au, Yung. 2022. "Data Centres on the Moon and Other Tales: A Volumetric and Elemental Analysis of the Coloniality of Digital Infrastructures." *Territory, Politics, Governance* 12 (1): 12–30. <https://doi.org/10.1080/21622671.2022.2153160>.
- Barbrook, Richard. 1998. "The Hi-Tech Gift Economy." *First Monday* 3, <https://doi.org/10.5210/fm.v3i12.631>.
- Birch, Kean., and Kelly Bronson. 2022. "Big Tech." *Science as Culture* 31 (1): 1–14. <https://doi.org/10.1080/09505431.2022.2036118>.
- Birch, Kean., and Fabian Muniesa. 2020. *Assetization: Turning Things into Assets in Technoscientific Capitalism*. Cambridge, MA: MIT Press.
- Braun, Veit. 2021. "Holding on to and Letting Go of Seed: Quasi-Commodities and the Passage of Property." *Journal of Cultural Economy* 14 (3): 306–318. <https://doi.org/10.1080/17530350.2020.1824934>.
- Braun, Veit, Saskia Brill, and Alexander Dobeson. 2021. "The Mutability of Economic Things." *Journal of Cultural Economy* 14 (3): 271–279. <https://doi.org/10.1080/17530350.2021.1911829>.
- Bresnihan, Patrick, and Patrick Brodie. 2021. "New Extractive Frontiers in Ireland and the Moebius Strip of Wind/Data." *Environment and Planning E: Nature and Space* 4 (4): 1645–1664. <https://doi.org/10.1177/2514848620970121>.
- Brill, Saskia. 2021. "A Story of Its Own: Creating Singular Gift-Commodities for Voluntary Carbon Markets." *Journal of Cultural Economy* 14 (3): 332–343. <https://doi.org/10.1080/17530350.2020.1864448>.
- Burrell, Jenna. 2020. "On Half-Built Assemblages: Waiting for a Data Center in Prineville, Oregon." *Engaging Science, Technology, and Society* 6 (June): 283–305. <https://doi.org/10.17351/ests2020.447>.
- Callon, Michel, and Bruno Latour. 2011. "'Thou Shall Not Calculate!' Or How to Symmetrize Gift and Capital." *Athena Digital* 11 (1): 171–192.
- Caussarieu, Maëlle. 2021. "Energy System Transition in the Making: Case Study of Greater Copenhagen District Heating Network." Doctoral Dissertation, Aalborg University.
- Childs, Quincy. 2022. "'This Has Nothing to Do With Clouds': A Decolonial Approach to Data Centers in the Node Pole." *Commonplace* June, <https://doi.org/10.21428/6ffd8432.59c985d5>.
- Chun, Wendy Hui Kyong. 2021. *Discriminating Data: Correlation, Neighborhoods, and the New Politics of Recognition*. Cambridge, Massachusetts: The MIT Press.
- Coleman, Gabriella. 2005. "The Social Construction of Freedom in Free and Open Source Software: Hackers, Ethics, and the Liberal Tradition." Doctoral Dissertation, University of Chicago.

- Collington, Rosie. 2022. "Disrupting the Welfare State? Digitalisation and the Retrenchment of Public Sector Capacity." *New Political Economy* 27 (2): 312–328. <https://doi.org/10.1080/13563467.2021.1952559>.
- Cooper, Zane Griffin Talley. 2021. "Of Dog Kennels, Magnets, and Hard Drives: Dealing with Big Data Peripheries." *Big Data & Society* 8 (2): 20539517211015430. <https://doi.org/10.1177/20539517211015430>.
- Cross, Jamie. 2014. "The Coming of the Corporate Gift." *Theory, Culture & Society* 31 (2–3): 121–145. <https://doi.org/10.1177/0263276413499191>.
- Dale, Ragnhild Freng. 2019. "Making Resource Futures: Petroleum and Performance by the Norwegian Barents Sea." Doctoral Dissertation, University of Cambridge.
- Dobeson, Alexander. 2021. "The Politics of Value Revisited: Commodities, Assets, and the Gifts of Nature." *Journal of Cultural Economy* 14 (3): 344–356. <https://doi.org/10.1080/17530350.2020.1846589>.
- Dourish, Paul, and Scott D. Mainwaring. 2012. "Ubicomp's Colonial Impulse." In *Proceedings of the 2012 Association for Computing Machinery Conference on Ubiquitous Computing UbiComp '12*, 133–142. New York, NY, USA. <https://doi.org/10.1145/2370216.2370238>.
- Doyuran, Elif Buse. 2023. "Nudge Goes to Silicon Valley: Designing for the Disengaged and the Irrational." *Journal of Cultural Economy*, <https://doi.org/10.1080/17530350.2023.2261485>.
- Ekbja, Hamid R., and Bonnie A. Nardi. 2017. *Heteromation, and Other Stories of Computing and Capitalism*. Illustrated edition. Cambridge, Massachusetts London, England: The MIT Press.
- Elder-Vass, Dave. 2016. *Profit and Gift in the Digital Economy*. Reprint edition. Cambridge, New York: Cambridge University Press.
- Eubanks, Virginia. 2019. *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. Reprint edition. New York: Picador.
- Flood, John, and Lachlan Robb. 2017. "Trust, Anarcho-Capitalism, Blockchain and Initial Coin Offerings." *Griffith University Law School Research Paper*, 17–23. <https://doi.org/10.2139/ssrn.3074263>.
- Fourcade, Marion, and Daniel N Klutetz. 2020. "A Maussian Bargain: Accumulation by Gift in the Digital Economy." *Big Data & Society* 7 (1): 2053951719897092. <https://doi.org/10.1177/2053951719897092>.
- Gonzalez Monserrate, Steven. 2023. "Thermotemporalities, Thermomasculinities: Uptime, Downtime, and Server Heat in the Digital Anthropocene." *New Media & Society* 25 (2): 324–344. <https://doi.org/10.1177/14614448221149938>.
- Graeber, David. 2014. "On the Moral Grounds of Economic Relations: A Maussian Approach." *Journal of Classical Sociology* 14 (1): 65–77. <https://doi.org/10.1177/1468795X13494719>.
- Greene, Daniel. 2022. "Landlords of the Internet: Big Data and Big Real Estate." *Social Studies of Science* 52 (6): 904–927. <https://doi.org/10.1177/03063127221124943>.
- Gregg, Mel. 2015. "The Gift That Is Not Given." In *Data, Now Bigger and Better!*, edited by Tom Boelstorff, and Bill Maurer. Chicago: Prickly Paradigm Press.
- Gregory, C. A. 2015. *Gifts and Commodities*. 2nd ed. London: HAU.
- Harvey, David. 1989. "From Managerialism to Entrepreneurialism: The Transformation in Urban Governance in Late Capitalism." *Geografiska Annaler. Series B, Human Geography* 71 (1): 3–17. <https://doi.org/10.2307/490503>.
- Hendrikse, Reijer, Ilke Adriaans, Tobias J. Klinge, and Rodrigo Fernandez. 2022. "The Big Techification of Everything." *Science as Culture* 31 (1): 59–71. <https://doi.org/10.1080/09505431.2021.1984423>.
- Henriksen, Sofie Elbæk, and Lisa Ann Richey. 2022. "Google's Tech Philanthropy: Capitalism and Humanitarianism in the Digital Age." *Public Anthropologist* 4 (1): 21–50. <https://doi.org/10.1163/25891715-bja10030>.
- Hockenhull, Michael, and Marisa Leavitt Cohn. 2021. "Hot Air and Corporate Sociotechnical Imaginaries: Performing and Translating Digital Futures in the Danish Tech Scene." *New Media & Society* 23 (2): 302–321. <https://doi.org/10.1177/1461444820929319>.
- Hogan, Mél. 2015. "Facebook Data Storage Centers as the Archive's Underbelly." *Television & New Media* 16 (1): 3–18. <https://doi.org/10.1177/1527476413509415>.
- Hogan, Mél, and Asta Vonderau. 2019. "Editors' Introduction to The Nature of Data Centers." *Culture Machine* 18: 1–4.
- Hogan, Mél, Dustin Edwards, and Zane Griffin Talley Cooper. 2022. "5 Things about Critical Data Center Studies." *Commonplace* October, <https://doi.org/10.21428/6ffd8432.af5934aa>.
- Holt, Jennifer, and Patrick Vonderau. 2014. "Where the Internet Lives: Data Centers as Cloud Infrastructure." In *Signal Traffic: Critical Studies of Media Infrastructures*, edited by Lisa Parks, and Nicole Starosielski. Champaign: University of Illinois Press.
- Kelty, Christopher M. 2008. *Two Bits: The Cultural Significance of Free Software*. Durham, NC: Duke University Press. <https://doi.org/10.1215/9780822389002>.
- Kelty, Christopher M. 2013. "There Is No Free Software." *Journal of Peer Production* 13.
- Laidlaw, James. 2000. "A Free Gift Makes No Friends." *The Journal of the Royal Anthropological Institute* 6 (4): 617–634.
- Libertson, Frans, Julia Velkova, and Jenny Palm. 2021. "Data-Center Infrastructure and Energy Gentrification: Perspectives from Sweden." *Sustainability: Science, Practice and Policy* 17 (1): 152–161. <https://doi.org/10.1080/15487733.2021.1901428>.

- Magalhães, João Carlos, and Nick Couldry. 2021. "Giving by Taking Away: Big Tech, Data Colonialism, and the Reconfiguration of Social Good." *International Journal of Communication* 15:343–362. <https://ijoc.org/index.php/ijoc/article/view/15995>.
- Maguire, James, and Brit Ross Winthereik. 2019. "Digitalizing the State: Data Centres and the Power of Exchange." *Ethnos* September:1–22. <https://doi.org/10.1080/00141844.2019.1660391>.
- Mauss, Marcel. 2016. *The Gift*. Chicago: University of Chicago Press.
- McGoey, Linsey. 2016. *No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy*. London: Verso Books.
- McGoey, Linsey. 2021. "Philanthrocapitalism and the Separation of Powers." *Annual Review of Law and Social Science* 17 (1): 391–409. <https://doi.org/10.1146/annurev-lawsocsci-120220-074323>.
- Munn, Luke. 2021. "Imperfect Orchestration: Inside the Data Center's Struggle for Efficiency." *Computational Culture* 8 (July), <http://computationalculture.net/imperfect-orchestration-inside-the-data-centers-struggle-for-efficiency/>.
- Murphy, Michelle. 2017. *The Economization of Life*. Durham, NC: Duke University Press.
- Neilson, Brett, and Tanya Notley. 2019. "Data Centres as Logistical Facilities: Singapore and the Emergence of Production Topologies." *Work Organisation, Labour & Globalisation* 13:15–29. <https://doi.org/10.13169/workorglaboglob.13.1.0015>.
- Noble, Safiya Umoja. 2018. *Algorithms of Oppression: How Search Engines Reinforce Racism*. Illustrated edition. New York: NYU Press.
- Oehlschlager, Mie, and Pernille Tranberg. 2023. Big Tech Soft Power Danmark." *DataEthics.eu*. <https://dataethics.eu/wp-content/uploads/2023/06/big-tech-soft-power-danmark-2023.pdf>.
- Pan, Darcy. 2022. "Storing Data on the Margins: Making State and Infrastructure in Southwest China." *Information, Communication & Society* 25 (16): 2412–2426. <https://doi.org/10.1080/1369118X.2022.2077125>.
- Pasek, Anne, Hunter Vaughan, and Nicole Starosielski. 2023. "The World Wide Web of Carbon: Toward a Relational Footprinting of Information and Communications Technology's Climate Impacts." *Big Data & Society* 10 (1): 20539517231158990. <https://doi.org/10.1177/20539517231158990>.
- Pedersen, Ove Kaj. 2018. *Reaktionernes Tid: Konkurrencestaten Mellem Reform of Reaktion*. Copenhagen: Informations Forlag.
- Pfotenhauer, Sebastian, Brice Laurent, Kyriaki Papageorgiou, and Jack Stilgoe. 2022. "The Politics of Scaling." *Social Studies of Science* 52 (1): 3–34. <https://doi.org/10.1177/03063127211048945>.
- Phan, Thao, Jake Goldenfein, Monique Mann, and Declan Kuch. 2022. "Economies of Virtue: The Circulation of 'Ethics' in Big Tech." *Science as Culture* 31 (1): 121–135. <https://doi.org/10.1080/09505431.2021.1990875>.
- Pipyrrou, Stavroula. 2014. "Altruism and Sacrifice: Mafia Free Gift Giving in South Italy." *Anthropological Forum* 24 (4): 412–426. <https://doi.org/10.1080/00664677.2014.948379>.
- Pistor, Katharina. 2023. "Rule by Data: The End of Markets?" *Law and Contemporary Problems* 83 (101): 101–124.
- Plantin, Jean-Christophe, Carl Lagoze, Paul N Edwards, and Christian Sandvig. 2018. "Infrastructure Studies Meet Platform Studies in the Age of Google and Facebook." *New Media & Society* 20 (1): 293–310. <https://doi.org/10.1177/1461444816661553>.
- Reinert, Hugo. 2018. "Notes from a Projected Sacrifice Zone." *ACME: An International Journal for Critical Geographies* 17 (2): 597–617.
- Rio, Knut. 2007. "Denying the Gift: Aspects of Ceremonial Exchange and Sacrifice on Ambrym Island, Vanuatu." *Anthropological Theory* 7 (4): 449–470. <https://doi.org/10.1177/1463499607083429>.
- Roitman, Janet. 2023. "Platform Economies: Beyond the North-South Divide." *Finance and Society* 9 (1): 1–13. <https://doi.org/10.2218/finsoec.8089>.
- Sadowski, Jathan. 2019. "When Data Is Capital: Datafication, Accumulation, and Extraction." *Big Data & Society* 6 (1): 205395171882054. <https://doi.org/10.1177/2053951718820549>.
- Salamon, Halvard, Simon Lex, and Torbjörn Friberg. 2016. "Konvergens på tværs af velfærdsstaten." *Tidsskriftet Antropologi* 72, <https://doi.org/10.7146/ta.v0i72.105617>.
- Salling, Caroline Anna. 2024. "From Incentives to Instructions: Climate Policy Mechanisms on Heat Pumps, Datacentres, District Heating, and Epistemic Collisions Hindering Decarbonisation in Practice." *Energy Research & Social Science* 111 (May): 103469. <https://doi.org/10.1016/j.erss.2024.103469>.
- Schiølin, Kasper. 2020. "Revolutionary Dreams: Future Essentialism and the Sociotechnical Imaginary of the Fourth Industrial Revolution in Denmark." *Social Studies of Science* 50 (4): 542–566. <https://doi.org/10.1177/0306312719867768>.
- Schwarz, Ori. 2019. "Facebook Rules: Structures of Governance in Digital Capitalism and the Control of Generalized Social Capital." *Theory, Culture & Society* 36 (4): 117–141. <https://doi.org/10.1177/0263276419826249>.
- Seaver, Nick. 2019. "Captivating Algorithms: Recommender Systems as Traps." *Journal of Material Culture* 24 (4): 421–436. <https://doi.org/10.1177/1359183518820366>.
- Seaver, Nick. 2021. "Care and Scale: Decorrelative Ethics in Algorithmic Recommendation." *Cultural Anthropology* 36 (3): 509–537. <https://doi.org/10.14506/ca36.3.11>.



- Sovacool, Benjamin K., Paul Upham, and Chukwuka G. Monyei. 2022. "The 'Whole Systems' Energy Sustainability of Digitalization: Humanizing the Community Risks and Benefits of Nordic Datacenter Development." *Energy Research & Social Science* 88 (June): 102493. <https://doi.org/10.1016/j.erss.2022.102493>.
- Srnicek, Nick. 2016. *Platform Capitalism*. Cambridge, UK: Polity.
- Staab, Philipp. 2024. *Markets and Power in Digital Capitalism*. Manchester: Manchester University Press.
- Strathern, Marilyn. 2012. "Gifts Money Cannot Buy." *Social Anthropology* 20 (4): 397–410. <https://doi.org/10.1111/j.1469-8676.2012.00224.x>.
- Taffel, Sy. 2023. "Data and Oil: Metaphor, Materiality and Metabolic Rifts." *New Media & Society* 25 (5): 980–998. <https://doi.org/10.1177/14614448211017887>.
- Tanninen, Maiju, Turo-Kimmo Lehtonen, and Minna Ruckenstein. 2021. "Tracking Lives, Forging Markets." *Journal of Cultural Economy* 14 (4): 449–463. <https://doi.org/10.1080/17530350.2020.1852949>.
- Taylor, A. R. E. 2019. "The Data Center as Technological Wilderness." *Culture Machine*.
- Tsing, Anna, and the Matsutake Worlds Research Group. 2009. "Beyond Economic and Ecological Standardisation." *The Australian Journal of Anthropology* 20 (3): 347–368. <https://doi.org/10.1111/j.1757-6547.2009.00041.x>.
- Tsing, Anna. 2009. "Supply Chains and the Human Condition." *Rethinking Marxism* 21 (2): 148–176. <https://doi.org/10.1080/08935690902743088>.
- Tsing, Anna. 2012. "On Nonscalability." *Common Knowledge* 18 (3): 505–524. <https://doi.org/10.1215/0961754X-1630424>.
- Tsing, Anna. 2013. "Sorting out Commodities: How Capitalist Value Is Made through Gifts." *HAU: Journal of Ethnographic Theory* 3 (1): 21–43. <https://doi.org/10.14318/hau3.1.003>.
- Velkova, Julia. 2016a. "Open Cultural Production and the Online Gift Economy: The Case of Blender." *First Monday* 21 (10).
- Velkova, Julia. 2016b. "Data That Warms: Waste Heat, Infrastructural Convergence and the Computation Traffic Commodity." *Big Data & Society* 3 (29): 1–10. <https://doi.org/10.1177/2053951716684144>.
- Velkova, Julia. 2021. "Thermopolitics of Data: Cloud Infrastructures and Energy Futures." *Cultural Studies* 35 (4–5): 663–683. <https://doi.org/10.1080/09502386.2021.1895243>.
- Viljoen, Salomé, Jake Goldenfein, and Lee McGuigan. 2021. "Design Choices: Mechanism Design and Platform Capitalism." *Big Data & Society* 8 (2): 20539517211034310. <https://doi.org/10.1177/20539517211034312>.
- Vonderau, Asta. 2019. "Storing Data, Infrastructuring the Air: Thermocultures of the Cloud." *Culture Machine* 18.
- Zuboff, Shoshana. 2020. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. New York: PublicAffairs.