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POLICY BRIEF

Data-center infrastructure and energy gentrification: perspectives from Sweden

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ABSTRACT

Which societal functions should be prioritized when the electricity grid reaches its maximum capacity? By using Sweden as an example, this policy brief discusses the societal negotiations that arise around capacity deficits of the electricity grid. By introducing the term energy gentrification, we aim to highlight the potential dangers of failing to recognize that energy also constitutes a societal resource, and like any other resource of the built environment, it is exposed to the risk of exploitation if left unprotected. We propose energy gentrification as an analytical perspective, through which negotiations and potential conflicts can be studied when grid owners must prioritize who should be connected to the grid. In relation to previous research on gentrification, we identify several parallels to the Swedish case of data centers, such as the relative prioritization of global versus local capital, the competition over resources, the allusion to promises of job opportunities and regional development for justification, and the tradeoffs between common goods versus private interests. The perspective of energy gentrification offers a useful approach for inquiring into the ethical dimensions of energy policies and for highlighting the bureaucratic nature of energy policy decision-making. The policy brief concludes by proposing opportunities for future research.

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Energy gentrification; electricity grid; limited capacity; data center; digital infrastructure

Introduction

Which societal functions should be prioritized when the electricity grid reaches its maximum capacity? This highly relevant question, for sustainable urban development in general and for future energy policy in particular, has in recent years become an issue of debate in certain parts of Sweden.

Since the launch of Facebook's first European data center in 2011, Sweden has attracted global technology-industry giants such as Microsoft, Amazon Web Services (AWS), and Google (all of which have either put into operation or bought land to construct large-scale data centers), in addition to a vast array of smaller actors building co-located data centers. By 2019, Google, Apple, Facebook, AWS, and Microsoft had acquired a total of 1,200 hectares (2,965 acres) of land in the Nordic countries (Bergquist et al. 2019). On a local level, these establishments have been positively welcomed, and interpreted to carry promises for local job opportunities, skill development, local economic growth, and favorable publicity for host communities. The tech giants' interest in Sweden in particular has been attributed to the country's favorable conditions, such as access to stable fiber-optic connections, relatively low energy prices, reliable energy production (with significant capacity for renewables), and a cool climate for dissipating the heat generated by the servers (ÖMS 2020b). In this context, the abundance of renewable energy in Sweden and the stability of the electricity grid have until recently been taken for granted by investors and local governments, as part of the available resources that justify why data centers could and should be located in the country.

Concurrently, certain regions in Sweden have during recent years experienced a lack of grid capacity, which has resulted in prioritization among energy users. Both industry and electrified public transport have been adversely affected and forced to postpone or withdraw plans for expansion. However, the limitations of grid capacity were not accounted for when local governments gave the green light to the new data centers. Most of these facilities by design use a vast amount of grid-supplied electricity. Due to preexisting capacity problems, the arrival of these data centers put additional strain on both the local and national grids. In addition, when the facilities are introduced into a local community, they also bring with them increased

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competition for electricity. This will ultimately culminate in a need to prioritize among users. When this happens, the question of which operations should be given priority arises. Should the grid serve a new data center or an expanding local business?

In this policy brief, we reflect upon the social negotiations that arise from capacity deficits in the electricity grid in relation to introducing energy-intensive digital industries in local communities. The issues at hand are twofold. First, the capacity limitations of the energy grid have not received adequate attention in conjunction with the planning of data centers and other energy-intensive infrastructural projects, and this perspective has generally been absent in public and scholarly debates. Second, only certain actors have been granted access to the regional energy-planning process in Sweden (e.g., Strand 2020), which has resulted in a risk that private interests supersede the common good. We develop *energy gentrification* as one perspective through which these processes and conflicts could be studied, and which could be employed in future research to address the implications for local communities from the complex entanglement between digital and energy infrastructures.

We use Sweden as an example to discuss how the energy-gentrification perspective can provide new insights and raise new questions in relation to energy grid-capacity problems and prioritizations in urban planning. Sweden is considered by the European Commission (2020) as one of the most digitalized countries in Europe, and is known for its historically low electricity prices. At the same time, the rapid electrification and digitalization has also made the country particularly vulnerable to disruption and blackouts (Di Silvestre et al. 2018).

The policy brief is structured as follows. The next section situates data centers as energy-intensive infrastructure that emerge in the context of ongoing re-orientation of digital industries toward "cloud" computing. The third section provides an overview of the current status of the Swedish energy grid and its most relevant challenges for future development. The fourth section describes some of the tensions that arise in Sweden when negotiating loads and capacities, especially between visions for local development, digital infrastructural futures, and energy-grid transformations. The fifth section proposes energy gentrification as a perspective through which to address these processes and frictions. The final section concludes by identifying opportunities for future research on energy gentrification.

The socio-material production of data centers

Data centers are the processing warehouses of the digital economy, built with the sole purpose of physically storing computing servers, and providing them with heat, power, and security. These facilities are sized according to their energy capacity, with recent constructions exceeding 100 megawatts (MW), equivalent to the power consumption of 80,000 homes (Hu 2015, 79).

Data centers are the enabling machinery behind the abstracted layer of cloud computing and new modes of value production from digital data. They are the backbone of the Internet's transforming infrastructure. Since 2008, most online traffic begins and terminates at data centers; they route streaming video and provide computation capacity for machine learning, algorithmic processing, and storage of sensory and meta-data captured through smart technologies and digital infrastructures (Cisco 2018). While actors in the digital industries have praised data centers as "the new wonders of the world" (Alger 2012) enabling a "fourth industrial revolution" (Schwab 2015), scholars and activists have extensively debated their environmental impact, energy consumption, carbon footprint, and economies of cooling servers (Cook et al. 2017; Cubitt 2016; Gilmore and Troutman, 2020; Hogan 2015; Maxwell and Miller 2012; Starosielski and Walker 2016; Velkova 2016).

In effect, seemingly decentralized and immaterial data have tangible effects on the existing arrangements that keep national energy grids operational (Morley, Widdicks, and Hazas 2018). The establishment of new data centers is estimated to increase the energy consumption of whole countries (Danish Energy Agency 2018), while also rearranging existing energy ecologies and practices related to energy use (Gabrys 2014). Despite the fact that for decades, digital technologies have driven fantasies about the immateriality and ephemerality of digital communication, seen often as a rupture with the old world of big energies and industrial manufacturing (Clarke and Henderson 2002), data centers are anything but re-materializing concerns about energy in the digital context. In essence, the expansion and increasing energy consumption of data storage should not only be a cause for concern for the technology industry (Koronen, Åhman, and Nilsson 2020), but also for society as a whole.

By contrast, digital technologies are also increasingly viewed as solutions to problems of energy provision and distribution in national contexts – often debated in the context of smart grid developments. The smart grid follows a vision in which the grid delivers low-carbon electricity more efficiently and reliably, while also enabling consumers to manage and reduce their energy use and minimize costs to the benefit of all. Lunde, Røpke, and Heiskanen (2016) define a smart grid as an upgraded electricity network that has enhanced two-way digital communication between supplier and consumer, intelligent metering, and a monitoring system. The smart grid is often perceived as the answer to many challenges of the current energy system, albeit in much need of development (Dang-Ha, Olsson, and Wang 2015). Like the abstract layer of cloud computing, making the energy grid intelligent requires material transformations to the existing arrangements in the grid. It also requires physical infrastructure such as data centers to compute, to store, and to process the communication between different digital technologies running through the grid.

Sweden as an exploratory case

Among the member states of the International Energy Agency (IEA), Sweden ranks as the fifth highest in consumption of electricity per capita. In 2016, consumption amounted to 136 terrawatt hours (TWh) and consumption per capita in the country has since 2015 remained around 13 MWh (Swedish Energy Agency 2019). However, Sweden also has the second-lowest share of fossil fuels in electricity generation among the IEA members. The electricity production share has remained the same during recent years, with nuclear and hydropower representing 40% each, wind power accounts for 10%, and mainly bioenergy and waste combustion constituting the remaining shares (Swedish Energy Agency 2019). In parallel, solar power micro-production of electricity, as well as diverse testbed projects for digitalizing the energy grid with the aim to organize renewable energy storage and "smarter" load balancing are currently on the increase. However, the geographical conditions of Sweden render solar power an unreliable source for large-scale electricity generation, as the production varies significantly throughout the day and the year (Axelsson et al. 2017).

On an annual basis, Sweden has an overproduction of electricity which is being exported to neighboring countries (International Energy Agency 2019). Stable energy production and access to renewable energy has rendered the country attractive for the data-center industry (ÖMS 2020b), which seeks secure and stable electricity supply to power its servers. Nevertheless, Sweden has in recent years experienced a critical grid-capacity deficit in certain regions. "Lack of capacity" or "capacity deficit" refer to one or both of the following issues: (1) an insufficient amount of electricity being produced, meaning that there is not enough power generation, and (2) the energy grid has insufficient capacity to connect and transmit electricity to the extent required (meaning that the grid is simply "full"). The former problem tends to be remedied by investments in new power plants to increase production, whereas the latter problem is generally resolved by investments in the infrastructure that transmits the electricity. Sweden's lack of capacity is often discussed as a result of the latter problem; i.e., although electricity is available, the energy grid cannot transmit the required amount of electricity (Byman, Koebe, and Ingenjörsvetenskapsakademien 2016).

The Swedish energy grid faces several bottlenecks and many of the transmission lines are old and require replacement. A majority of the country's electricity production is located in the north, whereas most of the consumption occurs in the south. The major challenge for energy sustenance in Sweden is thus to increase both the regional and north-south capacity, as well as cross-border capacity (International Energy Agency 2019). The capacity limitations have created a paradox: despite the country's overproduction of electricity, certain regions face an electricity shortage (Byman, Koebe, and Ingenjörsvetenskapsakademien 2016). However, the strategy of improving transmission lines may ultimately prove unsustainable, as the regional government of Northern Sweden recently stated that the rest of the country cannot rely on sharing their abundance as the regional demand will increase drastically.[1] It is estimated that future energy-intensive investments will consume most of the current load abundance (Region Norrbotten 2020).

According to the Swedish Transmission System Operator (TSO), the capacity problems began around 2015, with an increasing demand on the grid due to urbanization, establishment of new industries and data centers, and decommissioning of local cogeneration power plants as a result of changes in tax regulations (Länsstyrelsen Stockholm 2020b). However, it was not until 2018 that the media became aware of the lack of capacity in the grid, and several local businesses and the regional Distribution System Operator (DSO) consequently voiced their concerns (Energimarknadsinspektionen 2020b).

The Swedish Energy Markets Inspectorate (Ei), which is the national regulatory authority for energy in Sweden, asserts that the problem is related to growth and establishment of new demand. Specifically, Ei put forward data centers as an example and highlighted their requirements for large amounts of electricity. According to the inspectorate's chief economist, data centers are a novel phenomenon in Sweden and the connection of a data center is comparable to the connection of a new city to the grid, something which the grid is simply not designed for (Energimarknadsinspektionen 2018).

The establishment of data centers in Sweden

Sweden's stable energy grid, its availability of power, and its energy mix dominated by renewables have since the global financial crisis in 2008 increasingly attracted global technology giants to build data centers in the country (ÖMS 2020b). Starting with the launch of Facebook's first foreign data center in the Swedish "steel" town of Luleå in 2011, the nation has since welcomed Microsoft, AWS, and Google, all of which have either put into operation or bought land to construct new data-processing facilities. Additionally, a vast array of smaller actors is building co-located data centers to provide computational capacity. Google, Apple, Facebook, AWS, and Microsoft are anticipated to jointly deploy between 2.5 and 4 gigawatts (GW) of "IT power," i.e., a "load that needs to be [physically] deployed somewhere" (Bergquist et al. 2019). "IT power" signifies the data centers' need to be physically placed and connected to a power grid.

Similar to many other places around the world, such as Athenry in Ireland (Brodie 2020), Vaudreuil-Dorion in Canada (Velkova 2019), Prineville in the United States (Burrell 2020), and Gröningen in the Netherlands (Mayer 2020), the arrival of data centers in small towns and relatively remote regions of Sweden has been embraced in anticipation of local job creation and skills development, nurturing hopes of alleviating local economic, demographic, or social crises. Regional development agencies have argued for the importance of data centers to support the digital economy in Sweden and for turning data processing into a national "core" industry (Sokolnicki 2020). These organizations have also been concerned with securing cheap and stable access to electricity for these emergent digital infrastructures. As a means of supporting the national expansion of this industry, in 2016 the Swedish government lowered the tax on data centers' electricity usage to the same levels paid by industrial manufacturing in the country – 0.5 öre (0.06€) per kilowatt (kWh) (Regeringskansliet 2016).

Concurrently, local administrations and energy companies have been developing branded infrastructural zones (Easterling 2014) into which data centers could be "plugged." In Stockholm, such a district has emerged since 2015 under the banner of "Stockholm Data Parks," which considers data centers as a future heat provider and an actor in the future decarbonization of the city (Velkova 2021). Another popular brand has been "the Node Pole" formed around Facebook's data center in Luleå, where energy utilities and urban planners have attempted to establish an investment zone that markets the abundant hydropower of the Swedish north as an opportunity for establishing data processing as a local industry (Vonderau 2019b).

In other geographical contexts, similar developments have been used by local communities to gain symbolic autonomy from larger capital regions (Mayer 2019) or to reaffirm and rebuild ideas of territory and sovereignty (Rossiter 2017; Vonderau 2019a). Their anticipation of local development continues a tradition in which digital infrastructures are understood as necessary for producing and maintaining the welfare state (Castells and Himanen 2002), and for branding themselves as digital (Brodie 2020).

As discussed above, one of the main reasons for data centers to locate in Sweden is the relatively low energy prices. From an economic perspective, the facilities are thus disincentivized from producing their own energy. Nevertheless, in recent years Google and AWS have added to the renewable mix in Sweden by building their own wind-production capacity (e.g., Arstad Djurberg 2020; Nohrstedt 2019). At present, however, these developments only contribute to the current state of overproduction of electricity, while not resolving the pressure on local grid-transmission capacities. In other words, despite renewable energy generation, data centers remain a passive consumer of electricity. Furthermore, on a limited scale, attempts are also being made by Bahnhof (a Swedish Internet-service provider) and Luleå University of Technology to convert data centers into active contributors to the grid capacity through microgrid-energy generation. Bahnhof is testing this approach on a micro-scale data center in Stockholm, which could potentially contribute with up to 300 kWh during grid peak time (Kristensen 2020). A research lab in Northern Sweden is also experimenting with designing data centers to function as microgrids (Luleå University of Technology 2019). Yet, these initiatives are still experimental, very limited in scale, and hardly mitigate the existing grid-capacity problem. From the perspective of the existing Swedish energy grid, data centers do not represent an asset but rather a new source of demand that is sensitive to disruption (ÖMS 2020b). These circumstances have translated into a public debate about the extent to which the construction of large data centers would affect national grids and local electricity supply (e.g., Adelgren 2019; Hultgren 2019; Westrin 2019).

In the fall of 2019, the Swedish municipality of Staffanstorp announced, following a tough competition, that it had been selected by Microsoft as the site for its third data center in the country. Described by the town's mayor as the largest corporate project in the history of Staffanstorp, it carried the promise of making Microsoft into one of the largest employers in the municipality while also contributing to local development (Holm 2019). This decision was made behind closed doors by local officials without any opposition (Strand 2020), against the backdrop of the regional electricity-supply deficit.

At the same time, a number of projects and industries in the region have been negatively affected by the energy shortfall. An industrial firm that recycles plastic was compelled to rethink its expansion plans, as the regional DSO could not guarantee the electricity supply (Hugoson 2019). Similarly, a local company that manufactures ventilation systems is now looking to expand elsewhere for the same reason (Lärka and Ekhem 2019). Likewise, a commercial bakery was unable to expand its production due to the DSO's inability to guarantee the electricity supply (Capuder 2019). Another example is the harbor of Ystad, a major maritime node in Southern Sweden, which has warned that the capacity deficit will significantly impede its operations as it will be unable to cater to the electricity demand of docking ships during peak hours (Boström and Jähnke 2019). Other transport infrastructure in the region is also exposed. The regional DSO has raised concerns about how prevailing supply conditions will also impact the electrification of two new train tracks in the region (Magnusson 2018).

Similar situations have occurred in other regions of Sweden where the electricity supply is also constrained by a grid-capacity deficit. In Stockholm, where several data centers are currently under development (Länsstyrelsen Stockholm 2020a), a logistics center postponed until 2027 plans to electrify its fleet as part of an undertaking to reduce the firm's' carbon footprint because the DSO could not ensure the required electricity demand. For the same reason, a large supermarket canceled its plans to move into a newly built facility (Stockholms Handelskammare 2020). A local automobile dealer went as far as to file a lawsuit against the municipality regarding its decision to grant a building permit for a data center. The automobile dealer claimed that no investigation had been conducted concerning the future electricity demand of the region. Its concern was that the data center would consume all available electricity which would then interfere with the automobile dealer's plans to electrify its fleet. However, the court ruled in favor of the municipality's decision (Ristner 2020), despite the fact that the DSO announced that it could not guarantee new users access to the grid due to the capacity deficit (Lindehag and Johansson 2019).

A similar case took place just to the north of Stockholm, in the city of Gävleborg, where the residents filed a lawsuit following the local government's decision to sell municipal land to Microsoft. The litigants claimed that Microsoft's data center would consume all available electricity which would have ramifications for local businesses (Jansson 2019).

In yet other regions, the arrival of data centers has had consequences for the local energy supply. To the northwest of Stockholm, in the county of Västmanland, the construction plans for three new data centers were approved by local officials. Concurrently, the regional government has announced that no new major establishments (>10 MW) are possible. The county of Södermanland, southwest of Stockholm, is affected by the energy demand of existing data centers and has declined applications from energy-intensive businesses. No new major establishments (>5 MW) can be built (ÖMS 2020a).

While several local industrial facilities and infrastructural projects have been put on hold due to the grid-capacity deficit, data centers in Southern and Eastern Sweden have been given the green light. These projects all come with a promise of local development, be it transport and logistics infrastructure, manufacturing, retailing, food production, or data processing. However, the decisions of DSOs to grant grid capacity to certain installations and deny it to others affect regional businesses and may ultimately result in displaced actors. The DSOs should not be blamed for their decisions, however, since their practice is a direct result of Swedish energy policies. Current regulations are based on a "first come, first serve" principle, as the DSOs are mandated by law to connect any applicant to the grid in a nondiscriminatory manner (Energimarknadsinspektionen 2020a). In practice, this translates into waiting lists in the instance of a grid-capacity deficit, where each request is processed in the order of its date of arrival.

The aforementioned cases raise crucial questions about how the competing interests of various industries are negotiated for local development. What types of enterprises should be prioritized in the process? How should the societal contributions of different facilities be evaluated in terms of job opportunities, economic development, and the common good? And to what extent do data centers reshape local economies and infrastructures through grid capacity arrangements?

Energy gentrification as a perspective

As demand for resources, including energy, is expected to increase in inverse proportion with rising scarcity, competition is likely to escalate.

Whether governments ultimately address the rising contestation in energy markets or leave them to self-regulate, the societal ramifications may be dire as "markets left to function on their own without state intervention, will normally distribute goods and services on the basis of wealth" (Gould and Lewis 2012).

Within the fields of geography, urban planning, urban studies. and sociology, scholars have studied a similar process in connection with the consequences of deregulating the housing market – namely gentrification. Gentrification is generally described as the competition over land in general and housing in particular; a competition that commonly ends with the displacement of socioeconomically weaker groups. As housing has evolved into a commodity much like any other product, the market for residential accommodation has become financialized. And, as a result, housing is no longer regarded as a human right but as a resource ready for exploitation. Consequently, this development has benefited landowners and developers more than the society as a whole (Clark 2005).

The transformation process associated with gentrification is not only limited to bricks and mortar, but also includes elements such as open spaces, green areas, waterfronts, and the surrounding landscape (Quastel 2009). By gaining control over material conditions, powerful groups can manipulate the built environment to serve their own interests (Bryson 2013). As David Harvey (2005) has noted, the built environment is "a vast, humanly created resource system, comprising use values embedded in the physical landscape, which can be utilized for production, exchange and consumption." In essence, any resource of the societal structure may constitute an opportunity for exploitation and, as highlighted by Quastel (2009), it is the resource flows, in combination with social relations and power regimes, that causes gentrification.

By introducing the term *energy gentrification*, we aim to highlight the potential dangers of failing to recognize that energy also constitutes a societal resource, and like housing or any other resource of the built environment, it is exposed to the risk of exploitation if left unprotected. In doing so, we aim to expand understanding of what constitutes gentrification by applying the concept to the context of the energy sector. More specifically, the objective is to show much like the competition over land can displace residents, clashes over energy can displace energy users.

Gentrification in the housing sector concerns the escalating prices for residential accommodation that will ultimately displace socioeconomically weaker groups as they cannot afford their homes any longer. These residents are commonly pushed out from city centers to suburbs and peripheral regions. Clark (2005) portrays gentrification as the process of shifting demographics of land users, where the new land user enjoys a higher economic status, in conjunction with changes in the built environment through reinvestments. He also argues that gentrification is caused by the underlying mechanisms of "commodification of space" and "polarized power relations." Furthermore, Clark (2005) asserts that gentrification is omnipresent and its identification should not be limited only to central city changes, but incorporate any process that displaces people due to an influx of corporate capital. This usage is consistent with an expanding number of interpretations of gentrification and the fact that the term has become more open and encompassing over time (Lees, Slater, and Wyly 2008).

Energy gentrification replaces competition over land and housing with competition over energy, and the demographic of different socioeconomic groups with energy users, mainly larger consumers such as industries and other energy-intensive businesses. Energy gentrification may occur when new facilities are established and affect the energy supply in the region to the extent that the operations of existing users are significantly impeded or entirely liquidated. In its most extreme form, energy gentrification can also affect the energy supply of proximate municipalities and other communities. As demonstrated by the cases discussed above, the arrival of data centers has caused local businesses in Sweden to consider relocating their operations – in other words, they have been "pushed" away from the region. Ultimately, this may also affect the residents in the area as they will see job opportunities disappear when local businesses are displaced. Regional residents may also be adversely affected when infrastructural projects experience disruptions due to grid-capacity deficits.

In accordance with previous research on gentrification, we can identify several parallels to the Swedish case of data centers vis-à-vis lack of grid capacity. First, gentrification entails a competition over resources. As seen in the cases that we have presented, energy gentrification implies a struggle for electricity and access to the electricity grid. Second, the process of gentrification often includes unequal power relations and this inequity is expressed as a process where the actors "compete" on different terms as their level of influence is determined by their financial strength. For instance, the case of Microsoft in Staffanstorp displays a David and Goliath struggle where a multinational company competes against local businesses. Third, the process of gentrification also marginalizes certain actors in the decision-making process. Here, the case of Microsoft in Staffanstorp may also serve as an example, as the decision to grant the company access to the land was taken without consulting other interest groups. Fourth, gentrification is commonly masked as opportunities of local development and economic growth which justify its occurrence. As mentioned above, this narrative has also been present in the debates surrounding the establishment of data centers in Sweden. Fifth, gentrification is commonly a display of global capital versus local capital, meaning a process where international interests monetize local assets at the expense of the local economy. Revenue streams from resource extraction that otherwise would have remained within the local economy will instead be infused into the global economy. All of the cases that we have discussed show a global interest (data storage) that overrules the local economy (e.g., infrastructure), This ties into the sixth and final point, namely that gentrification may also set common goods against private interests. In other words, a powerful minority gains control over the built environment to satisfy their own interests (monetizing data storage) at the expense of the greater good of society (e.g., infrastructure and public transport).

With this policy brief we seek to stress the importance of understanding these six developments and to propose that they should be examined through the lens of energy gentrification. By applying an energy-gentrification perspective, otherwise invisible practices and actors at risk of being significantly impaired due to a grid-capacity deficit can be highlighted. Whether this is a real threat, and how the cases we have presented will unfold, is still to be verified. The perspective will regardless add another dimension to the debate on both data centers and lack of capacity in the grid.

We also believe that the notion of energy gentrification is useful for inquiring into the ethical dimensions of prioritizing between new establishments and infrastructural projects. In a recent report, Ei advises against having an agency assess the profile of energy users before granting them access to the grid. They deem that current policies are adequate and that the decision-making process can be developed within this framework (Energimarknadsinspektionen 2020a). However, we contend that current polices avoid ethical inquiries by relying only on market mechanisms. The perspective of energy gentrification compels ethical consideration and prioritization among the societal values of different industries. For instance, such examination could be whether data centers are more valuable than the opportunity to electrify public transportation that replaces fossil-fueled modes of mobility.

Another issue of concern that energy gentrification accentuates is the bureaucratic character of the predicament. Issues regarding prioritization and future development paths of the electricity grid have hitherto been regulated by outdated policies. The mandate of the TSO and the DSOs is strictly determined by Swedish energy policies, which stipulate that these organizations must connect any user to the grid in an objective and nondiscriminatory manner (Energimarknadsinspektionen 2020a). This directive implies that they are prohibited from declining or making any prioritizations among applicants despite capacity constraints. Under current conditions, this arrangement has translated into a "first come, first serve" practice with waiting lists, which is a scenario for which current policies do not provide any guidance. The lack of critical voices against the policies that regulate this critical decision-making process is conspicuous, which is yet another reason for why this issue deserves greater emphasis.

Policy recommendations and future research

With this policy brief, we aspire to reflect upon the implications of societies' lack of capacity in the electricity grid, in times where local communities see several potential benefits to welcoming electricity-intensive industries such as data centers. We seek to initiate a dialogue about the implications of reconfiguring the energy flows of local communities by establishing such facilities. The politics of grid-capacity distribution may both enable the establishment of new global digital industries and infrastructures and suppress and displace local companies and regional infrastructural projects. We have attempted to capture this tension through the notion of energy gentrification, which suggests a possible form of displacement that may emerge around energy flow and capacity allocation.

Energy gentrification opens up a series of questions in relation to current practices. Through this perspective we seek to highlight the importance of recognizing that data centers and other energy-intensive industries do not only constitute opportunities. Policy makers must realize that these facilities also constitute obstacles that can put enormous strain on the grid, which may engender further consequences for local communities and regional businesses. We believe that current policies avoid ethical inquires by relying only on market mechanisms to make distributional decisions, and we therefore contend that Ei reconsider its current policy about not requiring an assessment of the profile of energy users before granting them access to the grid. We believe that ultimately there must be a societal dialogue about which activities deserve to have priority when the electricity supply is limited. Having a dedicated assessment agency would be a step in the right direction. We would also like to stress that this organization should be as inclusive as possible to ensure that the widest possible range of interests is represented and to avoid unequal power relations. From a short-term perspective, the strain on the grid could to some extent be relieved if data centers were mandated by law to have capacity to be at least partly self-sufficient in terms of their energy requirements.

Future research should first address how energy gentrification works through the different arrangements and entanglements of energy and data infrastructures. Second, these developments should be juxtaposed to gentrification within the fields of geography, urban planning, urban studies, and sociology and seek to understand how energy gentrification relates to previous research on gentrification. Third, as societies are becoming more intensively electrified and digitalized, and driven by "smart" digital logics and technologies, data centers emerge as obstacles that propel multiple arrangements between digital industries and energy politics. Understanding the complexity of these intersections demands synergies and cross-pollination between energy scholars and media and communication scholars, as both fields maintain an interest in the connections between energy and the digital.

Note

1. The regional government of Northern Sweden comprises the counties of Norrbotten and Norra Västerbotten.

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