

The materiality of precarity: Gender, race and energy infrastructure in urban South Africa

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Abstract

Analysis of precarity has offered a critique of labour market experiences and politically induced conditions of work, housing, migration, or essential services. This paper develops an infrastructural politics of precarity by analysing energy as a critical sphere of social and ecological reproduction. We employ precarity to understand how gendered and racialised vulnerability to energy deprivation is induced through political processes. In turn, analysis of energy illustrates socio-material processes of precarity, produced and contested through infrastructure. Our argument is developed through scalar analysis of energy precarity in urban South Africa, a country that complicates a North-South framing of debates on both precarity and energy. We demonstrate how energy precarity can be reproduced or destabilised through: social and material relations of housing, tenure, labour and infrastructure; the formation of gendered and racialized energy subjects; and resistance and everyday practices. We conclude that analysis of infrastructure provides insights on how precarity is contested as a shared condition and on the prospect of systemic change through struggles over distribution and production.

Keywords

Precarity, social reproduction, racialization, vulnerability, surplus population

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Introduction

This paper develops an infrastructural politics of precarious urban lives by analysing energy as a critical sphere of socio-ecological reproduction in South Africa. Energy has been a prominent feature of oppression and contestation (Macdonald, 2009; Mitchell, 2011) and the South African economy has historically depended on a system of accumulation distinctive in its exploitation of both energy and labour (Fine and Rustomjee, 1996). Apartheid was maintained through mineral extraction and beneficiation, cheap electricity generated from domestic coal, and exploitation of black workers through a migrant labour system that simultaneously displaced the costs of social reproduction of labour power onto rural peripheries. All black people in South Africa were exploited to maintain a racially divided system of accumulation that was “uniquely dependent on electricity and uniquely electricity-intensive” (Fine and Rustomjee, 1996: 8). Under post-apartheid democratic rule, electricity access has been a powerful symbol of social inclusion and continued struggle of low-income residents to meet basic needs (cf. von Schnitzler, 2016). This paper employs precarity to understand how gendered and racialised energy deprivation is induced through political processes. In turn, we argue that analysis of energy inequalities illustrates socio-material processes of precarity, produced and contested through infrastructure.

Our first aim is to develop understanding of how precarity renders some people vulnerable to suffering through socio-material processes – those that operate through relationships between the human and the non-human world. We situate our analysis in South Africa, a country with similarities and important distinctions to the Northern economies where precarity has primarily been developed and deployed (Ferguson, 2015; Scully, 2016). We explore how energy precarity is reproduced or destabilised through socio-material relations, including intersecting materialities of housing, tenure, infrastructure and planning; the uneven management of energy supply and demand; and subject formation.

Our second aim is to integrate the infrastructural politics of energy access and supply with the gendered and racialised dynamics of energy demand. We use precarity to explore how gender and race are enlisted in municipal energy policy as a “development project” that represents low-income black women simultaneously as a vulnerable demographic and a latent entrepreneurial force that can be instrumentalised in policy. Finding that current policies in South Africa do not address precarity, we consider alternative sites and expressions of power. We explore whether strategies that engage with material practices of social reproduction and contestation of the state create incentives to contest precarity. We conclude that privileging production over distributive struggles may neglect important political strategies to contest precarity that stem from the livelihoods of the urban poor.

The paper is organised as follows. First, we situate our analysis within literature on precarity as a signifier of politically induced inequalities and the possibility of transformative politics. We then outline a multi-scalar qualitative methodology to study the materiality of precarity in urban South Africa. The analysis begins with description of how vulnerability to energy deprivation has been politically produced through intersections of planning, housing, tenure, gender and race. We then explore the uneven processes by which people and energy practices can be rendered governable, creating racialised and gendered energy subjects through municipal interventions in energy demand management and the creation of entrepreneurial citizens. The final section situates strategies of overt resistance and everyday energy practices within a discourse of precarity and explores the possibility for collective action to address precarity.

Precarity, infrastructure and difference

Butler (2009: 25) describes precarity as a politically induced condition “in which certain populations suffer from failing social and economic networks of support and become differentially exposed to injury, violence, and death”. Precarity is related to yet distinct from ‘precariousness’ – an ontological condition of bodily vulnerability that constitutes life in general and is shared by all (Butler, 2009). Precarity signifies a differential exposure to violence – a socio-political condition by which some subjects and populations are put at greater risk of suffering than others. As Harker (2012) notes, the political processes that produce differential precarity are not only social and economic but spatial, and recent debates have explored the significance and limits of precarity as critical spatial analysis (Burrige and Gill, 2017). First, precarity has been conceived as a distinctive condition to emerge from neoliberal labour markets and has been used to delineate a range of alternative politics, especially in the global North (Suliman and Weber, 2019; Waite, 2009). Second, precarity has been used to depict the uneven geographies of politically induced inequalities (Ettliger, 2007; Vasudevan, 2014).

Geographical analysis of precarity has proliferated through both registers, including relationships between precarity and labour geography (Strauss, 2018), home-(un)making (Harris and Nowicki, 2018), and asylum and citizenship (Arpagian and Aitken, 2018; Waite and Lewis, 2017). Scholarship on different forms of precarity has described structural inequalities and uncertainties that result from relations of domination along the lines of gender, race, ethnicity and class (Lorey, 2015). Recent analyses have expanded the conceptualisation of precarity and space (Ettliger, 2007: 319; Zeweri, 2017), responding to concerns that precarity has been theorised from social conditions particular to the global North (Munck, 2013). Critique has been directed towards precarity “as a single phenomenon” (Scully, 2016) that universalises historically specific meanings and particular contexts (Bremen, 2013). Ferguson (2015) argues that the association between precarity and production has privileged productive labour and obscured significant channels of distribution that have historically supported Southern African livelihoods. Similarly, South Africa’s broad-based anti-apartheid movement is often cited as disrupting concepts of precarity developed in contexts of near-full employment, having successfully linked class struggle with demands for citizenship rights from those excluded from the labour force but nonetheless exploited under white minority rule (Lee and Kofman, 2012). Alternative analyses have suggested unpacking the conceptual complexity of precarity by studying lived experiences (Barchiesi, 2011), situated and place-based struggles (Burrige and Gill, 2017), experimentations and encounters (Lee and Kofman, 2012).

Time is similarly important to analysis of precarity. Debates on the precarious nature of services and infrastructure provision in the global North often emerge – or at least intensify – during times of austerity or in reaction to events (Ettliger, 2007; Peck, 2012). Precarity may appear to signify ephemeral crises. Yet, as Suliman and Weber (2019) argue, this discourse risks obscuring connections between contemporary struggle and historical processes. Urban lives in the South have been depicted as perennial struggles, as improvisation and adaptation, or “hustle” (Thieme, 2017). An increasing number of people in both the global North and South live in a semi-permanent “state of emergency” characterised by an inadequate provision of services (Simone, 2004), discernible institutions (Vasudevan, 2014) and “incremental infrastructures” (Silver, 2014). Yet, the materiality of precarity has received limited attention (Mould, 2018), particularly regarding how material infrastructures and services associated with water or energy constitute precarity (Burrige and Gill, 2017; Vasudevan, 2014, von Schnitzler, 2016). Meanwhile, critical analysis of energy and

gender (e.g. Listo, 2018) and energy and race (see Newell, 2020) has only recently emerged. Infrastructure provides an analytical lens to explore the material basis of social relations. It emphasises that social relations including those of gender and race are encoded, negotiated and contested through material infrastructure (Graham and McFarlane, 2014; Larkin, 2013; von Schnitzler, 2016).

We use precarity as an analytical device by assessing how vulnerability to energy deprivation is politically induced through socio-material relations of infrastructure. Petrova (2018) proposes “energy precarity” to account for a fluctuating process of material deprivation underpinned by multiple material, social, and economic factors (Bouzarovski and Thomson, 2018). We advance understanding of energy precarity as a politically induced, gendered, racialised and geographically uneven process that operates across multiple scales and through the spheres of energy production, distribution and consumption. This approach draws on and complements energy vulnerability literature, which captures the dynamic exposure of individuals and households to energy deprivation, their sensitivity to the effects, and their adaptive capacity (Bouzarovski and Petrova, 2015; Middlemiss and Gillard, 2015). Vulnerability emphasises that deprivation is neither linear nor continuous, but a dynamic process (Rigg et al., 2016). Precarity provides insights on vulnerability as an outcome of political processes in and beyond the home that shape exposure to risk and harm – and hence as an axis of inequality rather than a universal condition.

This approach bridges a North-South binary within literature on energy deprivation or poverty. Energy poverty is commonly framed as an issue of demand and affordability in the global North, and an issue of access, supply and infrastructural deficit in the South (Bouzarovski and Petrova, 2015). An analogous distinction is evident in social scientific literature on energy in South Africa. Analyses of energy supply have critiqued systems of production that reproduce historic inequalities (Baker et al., 2014; Jaglin and Dubresson, 2016; Macdonald, 2009), but these studies remain disconnected from analyses of energy and social reproduction within the home, including how individuals, households and groups are unevenly rendered vulnerable to energy deprivation (Tait, 2017; Prasad, 2011; Winther et al., 2017). We use energy precarity to connect these processes, providing a political perspective on the spatial and temporal dynamics of getting into and overcoming a state of inadequate social and material provision of energy services in the home (Petrova, 2018).

Finally, in contrast to an understanding precarity as a condition (Butler, 2009; Lesutis, 2019), understanding precarity as a dynamic process aids analysis of the transformative possibilities or limits of precarity as a signifier of struggle, rebellion, or insurgency (Ettlinger, 2007). Precarity has been conceived as a capacity to resist subjugation by evading processes by which people are rendered governable and vulnerable (Waite, 2009). For both Lorey (2015) and Butler (2015), the constitution of precarity as suffering also holds the possibility for political mobilisation that contests the condition of precarity. Precarious lives may offer opportunities for positive imaginaries and political acts that unsettle the singularity of social order (Ranci ere, 2015). The struggles and tactics used by the urban poor to access services such as electricity in the global South have often been interpreted as rebellious, potentially transformative, or prefigurative of political alternatives (Alexander, 2010; Silver, 2014). While systems of informal provisioning can certainly be interpreted this way, the relationship between insurgence and informality is always complex, never linear, and complicated by relationships with material infrastructures and artefacts (Roy, 2009; von Schnitzler, 2016). Whether responsive strategies reinforce precarity or translate into transformative politics is an open question for place-based empirical evaluation (Lesutis, 2019). We analyse how precarity as oppositional politics may – but does not necessarily – challenge the socio-material order of gendered and racialised urban energy inequalities.

Methods

To analyse energy precarity in urban South Africa we adopt a methodology to identify how differential vulnerability to energy deprivation is produced and contested. We use qualitative data from Johannesburg and Polokwane – a metropolitan and secondary city, respectively – to explore multi-scalar processes of precarity in urban and infrastructural context. Both cities have active municipal programmes to address energy poverty in partnership with non-governmental stakeholders including Sustainable Energy Africa, an NGO partner in our research project. We analyse 42 interviews conducted by the first author between April 2017 and June 2018. Purposeful and snowball sampling were used to select interviewees from the energy industry, national, provincial and municipal government, non-governmental organisations, and activist and residents' organisations from outside policy-making and consultation arenas. Interview data is supported by observer participation at workshops with staff and external stakeholders of municipalities. Workshops focused on the development of a gender and household energy strategy in Johannesburg and reflections on municipal energy governance in Polokwane. Two workshops with analogous constituencies were also held in Cape Town on municipal financing and on strategy development for low-income energy services. All workshops were co-convened by the municipal government and Sustainable Energy Africa (Reddy and Wolpe, 2018).

Energy precarity in South Africa

South Africa is often an archetype of exception in political and economic analysis, neither representative of African or Southern experiences nor comparable to other industrialised economies. Generalisation is frustrated by particularities, including modalities of white minority rule, the racialised labour system, anti-apartheid struggle and – in the case of energy – a distinctive system of accumulation and exploitation (Fine and Rustomjee, 1996). Indeed, analysis of South African politics has been influential in critique of universalism – unsettling assumptions and de-centring theories, including precarity (Parnell and Robinson, 2012; Scully, 2016). Accounting for energy precarity in Southern cities requires accounting for the implications of structural unemployment, “informal” livelihoods, incremental housing and disrupted energy access. Here, we argue that vulnerability to energy deprivation is a product of “hyper-precarity” (Lewis et al., 2015) that entails complex socio-material relations of energy infrastructure, labour, housing, tenure and planning.

Urban governance underwent significant changes after apartheid, including fiscal decentralisation and the commercialisation of energy governance (Gentle, 2009; Pieterse, 2019). Market reforms accelerated decline in low skilled employment in mining and agriculture in particular (Seekings and Nattrass, 2005). Apartheid-era grants from national to local government were reduced and municipal governments became increasingly reliant on property taxes and revenues from services including water and electricity (Eberhard, 2007). Municipal electricity departments were ring-fenced, and costs of energy provision were shifted from state to consumer (Macdonald, 2009). Simultaneously, the extension of social grants and end-user subsidies such as a limited supply of free electricity provided new channels of distribution decoupled from labour (Ferguson, 2015). Writing on analogous water policies, Loftus (2004) describes a “strange double movement” in the commercialisation of governance and extension of the “free water commodity”. As we explore below, this neoliberal-era response to redistribution has both induced and moderated energy precarity in South African homes.

The imperative to increase energy access in South Africa has focused post-apartheid energy policy on an infrastructural deficit and increasing household electricity connections. Policy-makers suggest it wasn't until 2008 that energy affordability became a significant policy concern, when wholesale electricity prices began to rise significantly to fund new coal-fired power generation and debts began to accumulate in the energy sector (*Manager*, local government association; *Technical Manager*, City of Johannesburg). As electricity has become less affordable, non-payment or "theft" of electricity through illegal connections has increased, household consumption has declined (amid latent demand), and many smaller, poorly resourced municipalities have become increasingly indebted to the vertically integrated state utility, Eskom, which by 2019 faced restructuring to secure its survival (*Manager 1*, Eskom; *Manager 2*, Eskom). Where electricity is unaffordable or unavailable, cheaper alternative such as kerosene, candles, fuelwood, or coal typically replace the relative safety and convenience of electricity with a poorer service, insecurity of supply, and gendered vulnerability to the externalities of "dirty energy", such as fire risk and indoor air pollution. Where domestic electricity is affordable, it is reliant on domestic coal mining and power generation that create outdoor air pollution elsewhere. Although many low-income residents experience chronic vulnerability to energy deprivation (Reddy and Wolpe, 2018), the cycle of access and disconnection ensures that different forms of precarity and risk are dynamic.

This condition has been shaped by the primacy of electricity in South African domestic energy practices. With the isolation of the South African economy under apartheid and with significant surplus generation capacity in the 1990s, Eskom produced demand and shaped household energy practices around electrical appliances for energy-intensive household practices such as cooking, water heating and space heating:

This was during the time of Eskom plenty, when they were encouraging everything to be electric. What a mistake that was! You should rather have diversified your energy sources. But instead, we had this big brother called Eskom that would generate enough for everybody (*Manager*, Municipal-owned Distribution Company).

As such, recent efforts by some municipalities to diversify energy sources within the home are not only frustrated by the political economy of energy production (Jaglin and Dubresson, 2016), but by established household energy practices (City of Johannesburg 2015). As one government employee notes, electricity is highly valued for both its utility and its racialised, symbolic power:

It's because of the historical context – what it meant. And when the [ANC] government took over it prioritised electricity and entrenched the notion – the connection between the quality of life and electricity and water and housing. . . Electricity is so important in this country, because it symbolises access to services that are useful and that the privileged enjoy (*Manager*, government research institution)

For those who cannot afford electricity and for whom wage labour and secure income are an unlikely prospect, a grid connection remains one of several infrastructural signifiers of post-apartheid citizenship and inclusion (cf. Lemanski, 2019). The susceptibility of South African households to infrastructures of precarity and rising electricity tariffs has been politically induced through both socio-cultural and political-economic processes of energy production and consumption.

However, energy precarity is not simply described by insufficient supply or household income, it is infrastructurally conditioned. Many inefficiencies are locked-in to the fabric of housing and shaped by tenure systems. In this regard, energy precarity is shaped by *inflexible* material infrastructures as much as uncertain, flexible incomes. In a labour-scarce economy, South Africa's state housing program has been a principal policy of direct distribution delivered at scale, although the housing backlog remains substantial. Building houses and transferring ownership to the poor provides a capital subsidy to citizens whose prospect of wage labour remains slim, but who may lever their plot to generate income (Charlton and Meth, 2017). Various business opportunities are viable, including electronic repairs, hair-styling, and food vending. With some investment, plots are sub-divided into "backyard shacks" through which owners extract a surplus from tenants who typically pay most for space and electricity through a flat-rate rental, in exchange for proximity to limited economic opportunities. Hence, while South African cities remain spatially divided by wealth and race, territorial divisions can be poor indicators of how energy vulnerability is differentiated. Tenure status and formal state recognition alone can be similarly poor signifiers. As one government employee observed of domestic energy deprivation:

The only difference between formal and informal settlements can be whether you have an electricity connection. Income levels are similar. So, when informal settlements are connected formally by the municipality the [electricity] theft continues. . . Most people see shacks and assume they are informal; most are not (*Manager*, government research institution)

Less visible still are the complex relationships between gender and tenure. While a title deed is often assumed to clarify ownership and empower individuals (De Soto, 2000), tenure security can be eroded by the regularisation of settlements and the formalisation of customary tenure arrangements (Cousins, 2007). Meanwhile, plural, customary legal systems can similarly be used by men to resist women's claims to land (Whitehead and Tsikata, 2003). Legal processes often perform poorly in understanding complexity and improving upon existing tenure arrangements (Hornby et al., 2017). As such, precarious conditions of housing and energy can be politically induced through formalisation as much as by informalisation.

A variety of factors beyond the home also condition demand and induce energy vulnerabilities. Demand for backyard shacks highlights both an urban housing shortage and the enduring spatial legacy of apartheid labour exploitation. Accessing the city is an energy-intensive, time-consuming and expensive process for the poor (Reddy and Wolpe, 2018), while maintaining a place in the city can be a continual struggle amid rising land values and exclusionary urban policies (Budlender and Royston, 2017). Policy trade-offs are evident as provincial and municipal governments weigh the relative benefits of densifying inner cities or extending infrastructure to vast new "mega urban settlements" on urban peripheries (Harrison and Todes, 2017). The intimate socio-material relationships between urban planning, tenure, housing and energy highlight how energy precarity is politically induced through a multi-scalar process, ensuring that no singular policy domain addresses the experience of hyper-precarity.

Spatial-temporal politics of infrastructure and precarity

Energy precarity is elaborated further by accounting for how people and energy practices are rendered governable. Several authors have analysed metering and prepayment as governmental technologies that fetishize infrastructure and police the poor, creating

“calculative citizens” who economise consumption of essential social goods such as water and electricity (Loftus, 2006; van Heusden, 2008), whether or not people resist or embrace this subjectivity (Baptista, 2016). von Schnitzler (2016: 6) interprets prepayment meters as “technologies of precarity that reflect the multiple dilemmas and vicissitudes of life” after the age of formal employment, characterised by irregular incomes. For residents that remain on credit meters, electricity can be the first service to be withdrawn from defaulting residents in municipal supply areas. As one municipal employee commented: “Legally, you can’t disconnect a household’s water, you can’t stop the sewers, but you can disconnect electricity” (*Officer*, local government association). As a service that can be readily withdrawn from individual consumers without immediately endangering life, the materiality of electricity supply infrastructure shapes how residents are governed. For some analysts, improving service delivery through the state nonetheless means taking seriously the financial stress of municipal service providers, and prepayment technologies need not impoverish the poor if tariff structures are designed for redistribution (Parnell et al., 2017). Here, analysing the spatio-temporal management of energy demand can advance debates on the politics of metering that have become polarised (Jaglin, 2008), provoking useful normative questions such as: When is it reprehensible to render household energy practices governable?

It is illustrative to contrast the spatio-temporality of how domestic energy practices are governed in low- and high-income homes. A material infrastructural perspective on precarity reveals hierarchies of precariousness in differential access to basic services and exposure to risk. Like utilities elsewhere, South African municipal electricity distributors generate revenue from sales. Yet, at peak times, many municipal electricity distributors including those in Johannesburg and Polokwane pay Eskom more for the electricity they distribute than they charge consumers (*Manager*, City of Johannesburg; *Manager*, Polokwane Municipality). Hence, the daily and seasonal temporality of household energy practices have become a municipal concern. Load shedding provides the most immediate short-term measure to reduce demand, discursively linked to ‘overdemand’ from illegal connections in Soweto, where many residents do not currently pay for electricity, as a legacy of anti-apartheid rent boycotts. Load shedding is aggregated over territorial supply areas, but a series of interventions also reach into the household to reduce or shift peak demand, or “to manage peakiness” (*Manager*, City of Cape Town). An NGO representative noted that governing when consumers use energy is a challenging task, unevenly implemented:

It’s quite difficult to shift a low-income household because there’s less transport flexibility... The middle-income have a lot of potential in shifting peak... But people say the middle-income grumble, so we can’t do that. We always gear our service provision to the wealthy really – we put them to the least bother (*NGO representative*, Cape Town).

State support for energy efficiency may offer welcome cost savings for low-income households. Experiments in demand management include solar water heating in government-built housing, and energy efficient cooking technologies that reduce the fuel requirement of slow-cooked staple foods popular in low-income households and regions. Yet for one municipal employee, focusing demand management on the poor neglects latent demand, providing only partial solutions to energy deprivation:

We shouldn’t be telling the poor to use less energy; we should be helping them to use more... but no one wants to fund an education program for the wealthy (*Manager*, City of Cape Town).

Energy demand management is not inequitable simply for targeting interventions to low-income households. Yet, energy vulnerability is relational (Bouzarovski and Petrova, 2015), such that targeted interventions may be inequitable when formulated without reference to energy abundance and wealth. The gendered, classed and racialised inequities of demand management are particularly stark where black, female domestic workers fulfil many of the energetic functions of social reproduction (e.g. cleaning) in the homes of the wealthy, and have been rendered responsible by energy efficiency campaigns targeted at them by the electricity utility (Bracking, 2015).

In contrast, emerging strategies to govern demand from wealthier consumers have been subject to distinct temporal dynamics. In recent years a significant number of businesses and some households have installed generators or roof-top solar photovoltaic panels, reducing their demand for electricity from the grid and hence decreasing their contributions to municipal budgets (Janisch et al., 2012). Some municipalities fear this spatial reconfiguration of supply and demand could create a two-tier infrastructure system in which grid defection by the wealthy accelerates the decline of centralised grid infrastructure on which the poor will remain dependent (Baker and Phillips, 2019). Tariffs and temporality provide the means for municipalities to balance the loss of municipal revenue from the wealthy with the benefits of decentralised renewable energy generation. In Johannesburg, the municipal electricity company requires distributed solar producers to adopt new time-of-use tariffs and accept low payments for the power they export to the grid. These are justified as pro-poor policies, maintaining grid infrastructure as a social infrastructure of redistribution:

We're not incentivising it in any way. But I think the message needs to go out that we're using the increased margin on renewable energy to cross-subsidise the poor (*Manager*, Distribution company)

The temporal power that municipalities exercise over energy demand through tariffs is fragile, threatened by the medium-term prospect of battery storage that may allow wealthy consumers to store enough power for the evening and morning peak and for consecutive overcast days. Spatio-temporal power may shift from centralised state or corporation to a distributed network of wealthy "prosumers" (producer-consumers) of electricity with property and capital, reducing the ability of municipalities to maintain redistribution by governing energy practices in wealthy homes and businesses.

While energy precarity is a dynamic process, household energy practices are unevenly rendered governable through both spatial and temporal expressions of power. This raises questions about how governmental technologies induce or reduce different energy vulnerabilities, whose energy practices are rendered governable for the benefit of whom, and how state power should be used in engineering energy transitions. Clearly, household energy interventions are never politically neutral. As we explore below, gendered and racialised power is exercised through household energy interventions and the representations of women and gender empowerment that they can create.

Energy and social reproduction: Re-inscribing gendered and racialised precarity

If energy precarity can reproduce gendered and racial inequalities and vulnerabilities, then how does this occur? Much of the unwaged work of producing labouring bodies is gendered

and racialised, and services such as energy are crucial to social relations of reproduction (Bhattacharya, 2017; Meehan and Strauss, 2015). The gendered impacts of energy deprivation are widely recognised (Annecke, 2000; Prasad, 2011). Yet, many policies and analyses mobilise a problematic binary in the feminisation of energy poverty and the heroic entrepreneurialism of women who suffer the effects of energy deprivation disproportionately, refracted by intersectional identities (see Listo, 2018). Discourses of entrepreneurship are notable in how gender has been represented in South African policy debates. Chitonge (2017: 38) suggests that advocacy has shifted from gender-sensitive energy planning to a “narrow, class-based project of promoting the growth of elite businesswomen in the energy sector”. In part, this reflects post-apartheid policy of promoting a black capitalist class to increase control of core sectors of the South African economy, including energy (Southall, 2007). Here, we focus on the encounter between the entrepreneurial household and the local state, arguing that discourses of feminised poverty and entrepreneurship provide only limited insights into gendered and racialised precarity. We illustrate this account by exploring how relationships between gender, race and energy have been articulated by NGO and municipal employees involved in developing a gender-sensitive energy plan for the City of Johannesburg.

Energy is widely recognised as important for social reproduction, shaped through traditional gender roles performed within the home that render women more vulnerable to energy deprivation than men. An NGO Director describes feminised urban energy deprivation in familiar terms of gender roles in social reproduction:

There are many *female-headed households* in both [urban and rural areas], but many men and women are *unemployed* in the city. Even in households where men are present and working it is often the *women who control the household energy* – when the electricity needs to be bought. They are the ones with the power in that respect to make those decisions of whether they are *cooking* with solar or the Hot Bag [an energy-saving cooking appliance] . . . However, they may not be able to make the *decisions over the money* to be used. They are *the ones that are home* and also have *to travel* distance to buy paraffin or coal, *sit with kids* to do homework (*Director 1*, NGO, emphasis added)

It is important to document and recognise how individual needs, resources and interests are differentiated by gender (Matinga and Annegarn, 2013; Prasad, 2011). Yet, providing material resources does not necessarily affect power relations within households (Cornwall et al., 2008). Rather, gendered divisions of labour can be reproduced through household interventions that treat gender as an individual-level category. This is common with the introduction of energy efficient or labour-saving household technologies that are intended to reduce the costs and burden of household tasks:

My biggest focus is on women. If they don't have energy, they can't support their families. . . without them children won't eat, husbands wouldn't be clean and all this. So, we gave people solar panels and taught them about easy cook utensils. . . (*former Manager*, Ministry of Energy).

Furthermore, the introduction of new technologies can induce energy vulnerabilities. Off-grid solar home systems installed in informal settlements can often improve service provision, but typically do not meet all household energy needs. Sufficient for lighting but not cooking, these incremental solutions may form part of an inclusive energy policy for poor households, beyond the limitations of grid supply (discussed below). Yet, celebratory

accounts appear at odds with gender empowerment where new technologies formalise the flexibility that women exercise when required to choose between material needs:

Life is much easier and safer now. . . Now she can monitor her electricity consumption and make informed decisions. Is there enough electricity to watch TV for two hours and have lights on and charge her phone, or must she make a choice? (Sustainable Energy Africa, 2017)

Similarly, remedies are often individualised in efforts to unleash the productive potential of energy and women's labour (see de Groot et al.,2017). Expectations of flexibility and adaptability are embedded in rhetorical support for the entrepreneurialism of the poor, yet they can exploit the capacities of women and induce vulnerabilities. In municipal policy making, the entrepreneurial activity of women in poor neighbourhoods has been expressed as both a means and an end, where development effectiveness relies upon identifying entrepreneurial individuals with key characteristics:

I want to think about what these young people can do. If I'm going to work with someone I need to see some activity from them in the first place. . . Someone who can see the future; someone who is already business-minded; someone who is not waiting to be saved from the comfort of their bed (*Director 1*, NGO)

Similarly, the Director of a gender and energy NGO described how citizens should imagine their own contribution to reducing urban energy poverty:

[Interviewee]: . . .that SA is my country, Johannesburg is my city, and its alive with possibilities. There are needs here and if I can think and identify a niche and then I can answer that niche and set up a business, and empower myself and empower my community, for a fee. [. . .] Something needs to change and somebody needs to ignite and facilitate that change of mind set.

[Author]: What is that mind set?

[Interviewee]: To always be expecting things from outside, whether it's from government or from donors. (*Director 2*, NGO)

The policy focus on entrepreneurialism aims to tap into unutilised energies of young people and women in low-income neighbourhoods. It is not divorced from the state as facilitator, but is associated with common assumptions of a post-apartheid malaise, in which black, low-income citizens have grown dependent on the state and where channels of distribution are maligned:

. . .you create this ridiculous dependent child who cannot do anything. . . How does that help a developmental state? Do you want it to become a welfare state done badly – without the tax base and with people saying “I'm doing nothing, because the state does”? (*Manager*, City of Johannesburg)

Flexibility and adaptability are already evident in communal and individual strategies by which women negotiate urban life (Goebel, 2015), characterised by both co-operation and conflict (Mosotsa, 2011). Yet, daily improvisation is not the signifier of entrepreneurial activity invoked by the municipality. Different logics of entrepreneurialism are evident in corporate business models and those of poor urban residents (Thieme, 2015), which caution against an instrumental approach to entrepreneurial subject-formation. The rationalisation of investing in low-income women for more effective

development outcomes – informed by assumptions of misplaced entitlement and dependency – offers only a conservative approach of devolving responsibility to the household as an entrepreneurial unit.

The feminisation of poverty is likely to remain a significant narrative in mobilising support for gender-sensitive energy planning, which activists have struggled to institutionalise in post-apartheid energy policy (Annecke, 2000). Yet, well-meaning support for community-based solutions to energy poverty can exploit the flexibility and ability of women to adopt and balance responsibilities for social reproduction and income generation. This process of precarity places responsibility with women who may have few resources and limited power over the processes that render them and others vulnerable to energy deprivation. Under these conditions, strategies designed to reduce energy deprivation can reinforce energy precarity. Binary narratives of victimisation and heroic entrepreneurialism obscure the causes of energy deprivation, leaving gendered and racialised social relations unchallenged. As a mechanism of government, energy interventions have unevenly embedded market forces into the lives and homes of residents to create responsible subjects. As we explore next, these rationalities produce indeterminate encounters of market forces and social reproduction, where possibilities to contest gendered power relations are not foreclosed (Ferguson, 2010; Prügl, 2015).

Resistance and struggles with energy precarity

How then, might resistance and struggle with energy precarity be shaped to challenge gendered and racialised social relations? We argue that precarity offers insights into how vulnerabilities are contested as a shared condition, with potential for broader systemic struggle (Bhattacharya, 2017). We explore strategies of spectacular resistance and everyday practices as experimentation with how energy and infrastructures are constitutive of gender and racial inequalities (Eriksson, 2018; Suliman and Weber, 2019).

First, analysis of precarious energy access may illuminate trade-offs in the reproduction of risk. For example, off-grid solar technologies can currently meet fewer energy needs than grid electricity in low-income homes. For example, they provide insufficient power for cooking. Hence, a social enterprise that provides solar home systems in an informal settlement achieved “social acceptance” only after affirming that solar power would be a temporary solution, “while you wait for the grid” (*Manager*, social enterprise). From one perspective, municipal policy to promote off-grid solar technologies in informal settlements would require citizens to exercise flexibility: to choose between material needs and to accept a bifurcated model of citizenship that could formalise energy precarity and transfer responsibility for energy deprivation from state to low-income residents. This possibility is evident in how one municipal employee frames the development of an off-grid energy policy in Johannesburg:

We are looking for off-grid solutions to anything that the City provides as a basic service – we need to change the model from dependency to independency [...]. And which government doesn't want citizens to be more self-sufficient? (*Manager*, City of Johannesburg)

However, since grid supply is unaffordable for poor households, the security and quality of service provided by off-grid technologies can be greater, while the gendered and racialised health risks of “dirty fuels” that otherwise meet energy demand are reduced. Given the

symbolic importance of grid electrification and its significance in protest, the frequent failure of off-grid alternatives to secure social acceptance from users cannot be explained through a technocratic failure of community engagement. Alternative accounts of resistance and contestation should account for different forms of gendered risk, insecurity, vulnerability and flexibility that can occur on- and off-grid, and which can be induced through infrastructure formalisation or informalisation. An infrastructural account of precarity foregrounds these processes and the associated trade-offs, values and politics of technological interventions.

Similarly, analysis of precarity cautions against romanticising coping strategies or celebrating resistance uncritically. Many extra-legal means of accessing essential energy services have their roots in apartheid struggle and payment boycotts (von Schnitzler, 2016), including bypassing household meters, “ghost vending” of prepayment tokens, and illegally connecting unelectrified informal settlements to adjacent powerlines. Many can be characterised as ingenious, subversive means by which poor (and non-poor) people meet their energy needs without payment and challenge the commodification of social reproduction. Yet, many remain palliative and individualised strategies that reproduce multidimensional vulnerabilities associated with electrocution and fires that can spread quickly through informal settlements, reproducing precarity. Other household strategies are more socially structuring, including organised resistance to the installation of tamper-proof metering technologies, sharing pension payments collected by older women, or accessing energy services in the homes of others (*Residents*, Soweto; Mosoetsa, 2011). Literature on urban energy literature has reflected broader debates in urban studies over the conditions in which survivalist strategies, disengagement, subversion, or “social infrastructures” might be pre-figurative of alternative ways of organising services and alternative models of development (Angel, 2019; Bayat, 2000; Silver, 2014). Arguably, the state remains an important collective social structure to address energy precarity and secure material improvements made possible by “seeing and engaging urban spaces that are characterised simultaneously by regularity and provisionality” (Simone, 2004: 407). Analytically, attention to state agents and practices is important to understand how conditions of possibility enacted in the everyday are constrained or enabled.

Furthermore, precarity provides tools to analyse socio-material relationships between state, residents and infrastructure. In analysis of South African service delivery protests, Alexander and Pfaffe (2014: 217), conclude that “while there is social distance between workers and the poor, there is too much intermingling, family loyalty, lifestyle fluidity and shared experience for it to be helpful to explain this distinction... through a theory of class separation”. For Meagher (2019), informal workers are increasingly integrated into global value chains, and hence with producing value (for others). In contrast, Ferguson (2015: 41–47) describes a productivist misrecognition in accounts of a shared class position between workers and livelihood earners – one that oddly mirrors the liberal market misrecognition of the “informal economy” as a pool of micro-entrepreneurs. From this perspective, demands for ‘service delivery’ suggest that struggle over distribution may hold radical potential, claimed with reference to neither the “neoliberal ‘rights talk’ within which it is often subsumed” nor productive labour, but to a rightful share of socially produced material goods and services owed to a deserving citizenry (Ferguson, 2015: 47).

These politics of social stratification are engaged daily by those making collective demands for energy as a means of social reproduction. For a member of anti-capitalist group Soweto Electricity Crisis Committee (see Naidoo and Veriava, 2009), the challenges

of forging class-citizenship solidarity are significant, yet class remains a unifying category for those who experience energy and housing precarity under different conditions:

Landless people feel that “the state is helping everyone except us”. It’s not based on a systemic critique. . .it’s the politics of informal settlements. So, we have to win their trust on a different platform: we are a class. Whether you’re in a house or a shack, whether employed or unemployed, we’re a class (*Scholar-activist, Johannesburg*)

The radical platform invoked involves a combination of practical and rhetorical strategies, but debating modes of distribution such as electricity tariffs is discounted:

Other groups engage with that argument, calling for a more affordable rate. We say: “No! We are not paying”. We use global arguments that energy is a public good; a national argument that energy is a right; we use moral and socio-economic arguments. Then, working class arguments that workers produce energy so why should they pay twice? . . . As socialists, we make the argument as a transitional one. We envision a world where people get what they need (*Scholar-activist, Johannesburg*)

Similarly, Loftus (2006: 1039) emphasises the limits of contesting tariffs and illegal connections as secondary to and derivative of production and ownership, as “the relationships that first brought about the unequal distribution of water”. Instead, he locates the prospect of radical democratic change in reproductive labour – much of it performed by women – and situated knowledges that emerge from struggles to survive “in a world defined by both capitalist and non-capitalist social relationships”.

These debates over the political potential of distribution have implications for strategies to oppose energy precarity and to facilitate a “just transition” from South Africa’s coal dependency. Where ownership of energy production is contested in South Africa, distribution is critical to how markets are organised socially. South African unions that represent coal and power sector workers have failed to act upon their call for “socially owned” renewable energy generation, while actively opposing private sector renewable power projects. For their critics, opposition “just looks like another strategy of fossil fuel incumbency” (*Academic, Cape Town*), with disastrous effects for climate change and for air quality near coal mines and power stations. Meanwhile, global production networks for renewable energy technology make low- or high-skilled jobs in South Africa unlikely (Baker and Sovacool, 2017), such that prioritising production over distribution may neglect the interests of most workers and those excluded from wage labour.

Furthermore, decentralised solar power requires production to be understood within a new infrastructural context that situates the distribution network as site of struggle and empowers a new set of ‘prosumers’ with property and capital to capture the benefits of infrastructure ownership (Baker and Phillips, 2019). Bakker (2007) describes a set of unhelpful binaries of resource governance – public-private, citizen-consumer, commodities-rights – to which we may add producer-consumer. In the short term, distributive mechanisms such as tariff structures, property taxes and regulations provide tools for government to protect redistribution through networked infrastructure, tools that municipalities have uneven capacity and differing incentives to use. South Africa’s crisis of energy production – evident in Eskom’s financial deterioration and load shedding – is intimately tied to the politics of distribution – evident in ongoing discursive struggle over the meaning of non-payment for electricity as ‘theft’, patronage, or resistance – and social reproduction – evident in how people meet energy needs in practice. In these contexts, distributive struggles over the social

ordering of markets and infrastructure have potential to either address or entrench precarity. More fundamentally, an infrastructural perspective signals how production and distribution are difficult to disentangle, such that privileging production over distributive struggles may neglect political strategies that engage with the materiality of precarity that have radical potential.

Conclusion

In this paper, we have employed precarity to understand how gendered and racialised vulnerability to energy deprivation is politically induced. In turn, we illustrate socio-material processes of precarity, produced and contested through infrastructure. We situate energy deprivation within multi-scalar processes that produce it, in contrast to frameworks that remain focused on individual circumstance or political-economic analyses that privilege national and global scales over others.

First, energy precarity is induced through both political economic and socio-cultural processes, which unsettle binaries of production and consumption, formality and informality, resistance and passivity. As one dimension of “hyper-precarity” in South Africa, energy is related with racialised and gendered exclusions from labour markets, as well as inequitable systems of housing, tenure, planning and urban form. Multiple axes of difference including gender, race, class and citizenship affect whose lives are rendered precarious or affected by interventions in households and markets. As such, analytical frameworks are required that account for multiple processes of (in)security, (in)flexibility and (in)formalisation by which precarity can be reproduced or destabilised.

Second, precarity is a dynamic process rather than a stable state or condition, manifested and contested over space and through time. While many find themselves in a chronic state of vulnerability to energy deprivation, such conditions are continually reproduced and subject to multiple temporalities. Policies that are unresponsive to the dynamic character of vulnerability may be ineffective in tackling the multiple ways that people experience precarity. Lessons of previous essentialist or paternalistic efforts at gender-sensitive planning are rarely heard. Instead, we argue that gender, energy and race have become a development project in which empowerment of women is individualised and instrumentalised through processes of subject formation associated with productivity, commercialisation and entrepreneurialism. Gendered and racialised relations of energy production and consumption remain largely unchallenged.

Third, precarity can signify resistance, insurgency and struggle against a singular social order and expression of power through infrastructure. Energy precarity is contested daily in the spectacular resistance of South African service delivery protests and the everyday practices by which energy needs are partially met. Yet the challenge of transforming energy systems requires collective social arrangements that provide alternative systems of infrastructure, knowledge and power. As a process of subject-formation, precarity can render people and practices governable: an expression of socio-temporal power mediated through infrastructure. The burden of this change and the agency of citizens are distributed unevenly within society, such that social outcomes of subject-formation are not predetermined. So too, precarity as oppositional politics may unsettle or reinforce dominant social orders associated with the household, state and market, with production and distribution. As Berlant and Povinelli (2014) note, “The most unbearable precarity is in the radical individuality sold as liberal freedom, where people imagine that competition is what’s natural while relations that build worlds are exceptional”. It remains a political priority to foster collective

action that addresses the socio-material processes that inflict violence and harm, and to address precarity and as a shared condition.

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