

Climate Smart City: New Cultural Political Economies in the Making in Malmö, Sweden

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Abstract

The question of how the urgent transformation in fossil fuel based economies might be realised has come to occupy an increasingly prominent place within the social sciences. The challenge here is often cast in terms of how one or more existing system can be replaced by alternatives in which the carbon content has been removed or at least diluted by purposeful interventions. Here we approach the question from a different angle, asking how ongoing transformations in critical systems (in this case energy) are or may be leveraged in relation to climate change. We take as our focus the emergence of the smart city and examine a case in which the notion of the smart city has become wedded to the ambition for a low carbon city: Malmö, Sweden. As commentators suggest, the growth of the smart city reflects a capitalist reflex to develop new waves of investment to realise new arenas for capital accumulation in the city. Yet shifting from this broad political economy diagnosis, we argue that there is a need to attend to the ways in which climate is imbued and embedded in the smart city and how this in turn enables and constrains low carbon transitions.

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1. Introduction

As decarbonisation has begun to gain traction as a means through which the climate problem is framed and solutions sought, a two broad approaches have been developed to forecast how such large scale transformations in the economy might be achieved. First, a suite of models, scenarios and analyses have been developed to identify which (combinations of) technologies and policy instruments need to be deployed in order to achieve long-term and deep cuts in carbon emissions (e.g. Capros et al. 2014; Gerlagh and Van der Zwaan 2006; Azar & Sanden 2011). In such assessments, different *pathways* through which low carbon transition can take place are determined by the combination of interventions at the disposal of policy-makers and the uptake of different kinds of innovation. Evaluations of such approaches suggest they are marked by several commonalities in terms of technical priorities, including those related to energy efficiency, the uptake of renewable energy and carbon sequestration, and an emphasis on cost effectiveness and a mix of market and regulatory instruments as the means through which to affect such change (Wiseman et al. 2013). Where critical differences emerge there are between “those strategies that advocate for a relatively incremental approach to post-carbon transitions – with less ambitious targets and timeframes for emissions reduction or renewable energy transitions – and those that emphasise the need for more rapid and transformational change” (Wiseman et al. 2013: 91).

Whichever stance is adopted, however, the development of these accounts of future pathways to decarbonisation tend to neglect the social dynamics of transition and in particular to pay limited attention to

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the politics of how such transitions might be achieved and contested. A second set of approaches has been underpinned by the rapid growth of transition studies, developed from research on innovation and the dynamics of large technical systems (Geels and Schot 2007; Smith et al. 2010). Transition research has sought to explain how particular innovations are taken up and come to achieve a wider effect on the systems of which they are part. This literature has directly sought to counter any sense that low carbon transitions are simply a matter of the roll out of technology or the deployment of particular policy instruments pointing instead to the significant inertia in existing socio-technical configurations and the work involved in promoting transitions towards sustainability. Following widespread critique that despite their efforts to engage with the social dynamics of transition such analyses tended to neglect the power and political economies at work (Avelino and Rotmans 2009; Meadowcroft 2009; Shove and Walker 2007) more recent analyses have drawn attention to the importance of opening up space to consider the ways in which sustainability transitions are political (Avelino 2017; Bernstein and Hoffman 2018; Healy and Barry 2017; Geels 2014; Geels 2016; Rosenbloom et al. 2016; Strippel and Bulkeley 2020).

From these initial roots, and particularly the second broad body of work concerned with the social and material dimensions of transitions, concern with understanding the potential transformations required to achieve long-term sustainability goals has grown across the social sciences. A diverse range of scholarship has provided important insights about the nature of the 'lock-in' of current high carbon systems and of the dynamics and potential for low carbon experimentation (Unruh 2000; Fouquet and Pearson 2012; Levin et al. 2012). Yet more often than not, the focus of such analyses is on those interventions which are specifically designed to address climate change or sustainability more broadly, such that other dynamics, capacities and agents within such systems tend to be neglected. One crucial case in point is that of urban (re)development. As the potential for cities to address climate change and sustainability has risen on the global agenda, so too has a concern to understand the ways in which low carbon transitions and forms of resilience are being enabled on the ground. Yet often such accounts neglect to engage with the ways in which cities provide vital sites for multiple forms of political economy that are shaped by drivers and powers beyond those directly concerned with low carbon goals. Understanding how societal transitions may occur therefore requires engaging with the ways in which different agendas come into conflict or are made commensurate through the work of urban (re)development in particular contexts and conditions.

The recent rise of the smart city is an important case in point. Now seemingly ubiquitous, smart cities are variously framed as offering solutions to socio-ecological problems while also creating new avenues for the development of (urban) capitalist economies. The promise of the smart city is one of not only accommodating global urbanism but of creating new forms of economy that are compatible with planetary boundaries on the one hand and capable of providing the means through which urban environmental impacts can be ameliorated and resilient urban communities sustained. Through a series of interwoven narratives and specific sites of intervention, smart cities have become part of the "contemporary language games around urban management and development ... [involving] experts, marketing specialists, consultants, corporations, city officials, etc. ... [which] frame how cities are understood, conceptualized and planned" and are performative in serving to shape the practice and concrete form of urbanism (Soderstrom et al. 2015: 307). While there are alternative visions, values and actors involved in narrating smart urban futures, to date this is a form of urbanism that has been dominated by corporate actors and state-based political interests.

Thinking through the smart city then provides one avenue through which to develop an account of the extent to which low carbon transition can be leveraged through ongoing processes of transformation in the economy and the limits that may be encountered. This is a critical challenge if we are to understand the politics and economy of climate responses beyond those which wear their climate credentials on their sleeve. In the next section, we provide an overview of the debate on the rise of the smart city as a political economic project before considering the emerging critique that such an account has served to create an overly uniform and structural account of smart urbanism. We suggest too that this approach has so far tended to neglect the critical ways in which the smart city both relies on and seeks to address ecological concerns. Accounting for

this form of contemporary capitalist response to the ecological problematic requires, we suggest, not only greater attention to the specificities and implementation of smart city narratives, as others have suggested, but also an engagement with conceptual perspectives that open up the socio-material and ecological means through which power is orchestrated and politics conducted in the urban arena. To this end, we suggest that an engagement with a cultural account of political economy can usefully draw attention to the socio-material nature of urban/infrastructure systems providing valuable insights into the nature and dynamics of contemporary capitalism's engagement with the ecological realm. In the third section, we turn to the case of Climate Smart Hyllie, Sweden, as one manifestation of how urban cultural political economies of the smart city are being realised in and through responses to ecological crises. We show how the form of smart urbanism emerging in Hyllie is configured through climate change both in terms of its assemblage in social and material terms as well as in terms of the new forms of climate-smart metabolism it seeks to engender.

2. Smart City Political Economies

While there is a grain of truth in the quip that the rise of the notion of the 'smart' city has been primarily a matter of most urban leaders wishing to avoid being regarded as 'dumb', the rapid take up of the discourse of smart urbanism across the urban landscape has been significant. The smart city has been championed by economic actors seeking to bring data monitoring and analytical tools to the urban environment, by local governments seeking to demonstrate their efficiencies in times of austerity, and by policy makers hoping to champion new forms of economic development alongside the potential for creating new markets for technological innovations. The emergence and rising popularity of the smart city discourse is generally traced to two, interrelated roots. First, to the increasing role of (big) data in the monitoring and management of cities, usually in digital form. Here, the term smart city is used to denote the "pervasive and ubiquitous computing and digitally instrumented devices built into the very fabric of urban environments ... that are used to monitor, manage and regulate city flows and processes, often in real-time, and mobile computing (e.g., smart phones) used by many urban citizens to engage with and navigate the city which themselves produce data about their users (such as location and activity)" (Kitchen 2014: 2). Second to longer term shifts within urban governance that have witnessed the emergence of "the neoliberal re-visioning of city managerialism, the development of urban entrepreneurship in the 1980s and 90s and the concepts of smart growth and new urbanism" (Kitchen 2015: 133). Taken together, big data and new politics have been seen as essentially heralding a new era of capital accumulation under the banner of the smart city. Though as we go on to explore below, alongside attempts at restructuring the urban arena and generating new kinds of political economy have been attempts at harnessing the smart city agenda for environmental ends, which raise important questions about how we might understand low carbon political economies.

2.1 Smart Accumulation?

The conjoined roots of smart city discourses in urban economic restructuring and the reconfiguring of urban systems through the entry into the arena of new economic actors related to the growth and development of computing systems and services have led many scholars to view the emergence of smart urbanism as a new wave of neoliberal political economy (cf. Harvey 1989). Here, smart urbanism is seen as a means through which elite economic actors can both seek to shift state priorities in order to open up the potential for the privatisation of urban systems and their management whilst also advancing their particular technical solutions and products as means through which urban challenges can be addressed (Kitchen 2015; Hollands 2015). In short, the smart city signifies a new wave of neoliberal urban restructuring through which capital accumulation takes place. Previously unproductive assets (e.g. traffic lights) are made to work to realise new economic flows and untapped potential, for example in the form of data from flows of resources or individuals, becomes realised as an asset that can be capitalised. Such restructuring also serves as a means through which new forms of splintering urbanism (Graham and Marvin 2001) are enacted, providing access to advanced forms of service and provision for some whilst excluding others less able to participate in the digital economy or access 'smart' services. And all the while the overtly technical nature of the discourse of smart urbanism seems to

defer proper political engagement, such that at first glance its politics have much in common with the 'postpolitical' condition identified by Swyngedouw as central to managerialist approaches to urban redevelopment (Swyngedouw 2009).

Yet for all the persuasive power and important normative aims of such critiques, the ubiquity of the account of smart urbanism that emerges may hide as much as it reveals. Focusing on smart urbanism as a newly dominant neoliberal political economy tends to obscure the actual forms of transition taking place in cities by virtue of the smart city discourse and the ways in which this is taking shape on the ground. As Kitchen (2015) suggests much of the literature has been limited by a "lack of detailed genealogies of the concept and initiatives, the use of canonical examples and one-size fits all narratives, an absence of in-depth empirical case studies of specific smart city initiatives and comparative research that contrasts smart city developments in different locales and weak collaborative engagement with various stakeholders" (Kitchen 2015: 132). Of particular importance in our argument here, such accounts of the rise of smart urbanism have paid relatively little attention to the ecological promise of their discourse and practice, despite narratives concerning the potential for low carbon transition and wider forms of sustainability being central to the configuration and performativity of the smart city (see Merricks White 2016). The work of making new forms of economy in the city is always also a matter of (re)configuring the metabolic flows through which resources, power, capital and economy are made. So we suggest it is also the case with the smart city. Creating new smart urbanist economies also requires the reworking of ecologies whose dynamics are unpredictable and often exceed efforts to manage them (Kaika 2005). Understanding the particular ways in which the ecological is included within the discourse and practice of smart cities – and hence the extent to which such urban interventions are capable of radically transforming cities towards sustainability – is then an imperative. At the same time, it becomes vital to take into account the political work being enacted where the transformative potential of the 'smart' city is deliberately bought to bear on specific environmental problems, whether that be climate protection, resilience, localisation of food economies and so forth. In short, it requires that we recognise the multiplicity of ways in which smart urbanism is being made in relation to different forms of sustainability transition.

2.2 Smart Urban (Climate) Improvement

Starting to open up the ways in which climate change and other environmental issues are articulated through and integrated within smart city projects does more than remind us that such concerns are now firmly positioned within neoliberal projects for urban redevelopment. Raising these questions also shows that how and why smart urbanism is being pursued, and with which consequences, can not simply be read off from the interests seemingly involved in the design and implementation of specific projects. Rather than seeing smart urbanism as a ubiquitously dominant or stable hegemonic mode of neoliberal restructuring, such interventions can more productively be regarded as 'hegemonic projects in the making', in which what constitutes both the interests of the state and of economically dominant actors are forged and contested. As "strategically constructed concrete programmes of action" such hegemonic projects provide the means through which specific institutional state forms are generated and the agendas of dominant interests advanced (McGuirk 2004: 1023), all the while being open to revision and retraction as what constitutes 'interest' is continually open to question.

Such an approach requires that rather than being able to discern what might constitute the interests of the state or dominant economic actors from the outset, the ways in which 'smart' interventions are constituted, enacted and contested provides a field within which these interests are in themselves formed. This means that as well as paying attention to the key political economic interests that are involved, understanding the smart city requires that we also examine the practices of assembling (Shelton et al. 2015; March and Ribera-Fumaz 2016) or configuring (Gabrys 2014) the smart city because it is in these dynamics and moments that its potential is realised. As Vanolo (2014) argues, this is a project of improvement in which different elements of the city come to be understood in new ways as constituting the 'good' city:

“On the one hand, smart city policies support new ways of imagining, organising and managing the city and its flows; on the other, they impress a new moral order on the city by introducing specific technical parameters in order to distinguish between the ‘good’ and ‘bad’ city.” (Vanolo 2014: 883)

For Vanolo (2014: 884), smart city is a form of governmentality – smartmentality – which offers a ‘new diagram of government’ through which what constitutes the city is imagined and disciplinary mechanisms, techniques of control and self-government, used to police these boundaries. Other authors turn to the work on actor-networks to make similar arguments. From such a perspective, the smart city can be understood as assembled through circumscribing particular problems to be addressed such that the actors and tools of the smart city become ‘obligatory passage points’ through which urban management must be undertaken in order to be seen as legitimate responses to the challenges at hand (Soderstrom et al. 2014). Despite rather profound differences in these approaches, they have in common an understanding that governing does not involve the ‘roll out’ of a pre-determined political economic order (neoliberal or otherwise). Instead governing is found to require “that a diverse range of actors and entities are bought into agreement in order to articulate and enact particular governmental intentions in the form of programs or interventions” (McGuirk et al. 2016: 147). Moving from the abstract intention to ‘improve’ the city through smart urbanism requires not only that particular solutions are designed, but also that they are implemented in certain ways – in short, *how* governing is accomplished matters. For McGuirk et al. (2016) crucial to this process is the work of configuration, which involves both *narrating* the storylines that connect the problems to be addressed with the solutions to be undertaken, as well as the work of “*ordering*, devices used to establish the appropriate sociomaterial arrangements through which the will to govern can be realized in specific projects” (McGuirk et al. 2016: 149). This configurational work – the ways in which smart urbanism comes to be made in relation to its intentions to realise improvement – is crucial in terms of the ways in which addressing climate change comes to be realised (or not) as part of these forms of urban transformation.

In pointing to the importance of narration and ordering, McGuirk et al. (2016) suggest that the work of configuring smart urbanism as a climate response involves more than simply framing the smart city as a climate solution. Instead, it involves ongoing work in which particular techniques, interventions and forms of materialism play an active part in the making of urban assemblages through which governmental projects are realised. An analysis of the work involved, we suggest, can benefit from taking a *cultural* political economy perspective. Developing their perspective from anthropological engagements with the notion of culture, Bulkeley et al. (2016: 8) suggest that analysis of climate’s cultural political economies can productively be developed by recognising culture as “(re)produced through the assembling and mobilisation of material objects and the kinds of actor networks and socio-technical configurations through which they are constituted.” This in turn opens up the sites and agents involved in both maintaining high carbon forms of society and those efforts which seek its transformation from those which are formally designated as political (e.g. the corridors of power) or economic (e.g. the production system) to those involved in normalising and sustaining what it means to live in a high/low carbon world (e.g. the bike lane, the catalogue, indoor temperatures). In the next section, we turn to the case of Malmö, Sweden, and examine how long-standing efforts to achieve a low carbon transition in the city have been galvanised and reconfigured through the emergence of smart urbanism.

3. Becoming Climate Smart: Reconfiguring Hyllie, Malmö

The suburb of Hyllie, on Malmö’s urban fringe, has found itself newly positioned at the centre of efforts to engage with the emerging trend of smart urbanism as national agencies, transnational corporations, local governments and European programmes have recognised its potential as a site within which twin objectives of testing the potential for new socio-technical ‘smart’ interventions and for realising low carbon transitions. Leftover from the wave of urban development that marked Swedish urbanism in the late 1960s and early ‘70s, when it was positioned on the outskirts of Sweden’s southernmost city and relatively isolated from both

Copenhagen (a 2-3 hour bus and ferry ride) and Stockholm (more than 5 hours by train), that Hyllie should find itself now at the centre of gravity of the emerging 'climate smart' economy in Sweden has been a far from straightforward transition. Rather than being the matter of the imposition of a grand plan for smart urbanism through the roll-out of particular neoliberal designs on urban futures, through this account we want to suggest that the making of the smart city in Sweden has been the result of ongoing configurational work that has taken place across multiple sites and through processes in which climate and sustainability have featured as significant matters of concern, coming to be so bound up with the idea of the smart city that they are no longer separable. Here we find that it was indeed through roots in the knowledge economy and new ways of governing the city that the idea for making Malmö 'smart' began, but that as urban experimentation with climate and sustainability took hold, and specific design ideas, technologies, materials and norms about urban development began to circulate, redevelopment in the city came to be cast in a different light and new possibilities for low carbon transitions came to be considered.

3.1 Making the Low Carbon City

Development in Hyllie was relatively abruptly halted in the early '70s when financing for the 'Million Homes' programme began to dry up, and further economic decline ensued in the city during the 70s and especially in the 1980s as the city's once significant shipyards closed. Various attempts at reviving the economy, including the sale of the shipyards to private industry, were made with little success through the late 1980s and early 1990s. But the launch in 1994 by the newly elected Mayor Ilmar Repaalu of *Project Malmö 2000* intended to enable the city to join 'the knowledge society' as a means through which to achieve economic competitiveness made a difference. Focused on the former shipyard area of the city, Western Harbour, and presented in 1996 as *Vision Malmö 2015*, the strategy contained plans for its redevelopment through a housing exhibition (Bo01) and a new university campus as a means through which a new knowledge economy could be realised in the city. In this initial conception, it was the discourse of urban improvement through the knowledge economy that dominated the development arena. Yet the discourse of what might be considered as desirable urban futures began to shift during the 1990s, with the Hammerby Sjostod development in Stockholm began to attract global attention and enable Stockholm in particular, and Sweden in general, to position itself as at the cutting edge of sustainability whilst urban planning globally came to embrace the logic of the 'new urbanism' originally born in the US as the means through which urbanism could come to take a different form. As the ideas, designs, and technologies formed within Hammerby Sjostod began to circulate within Sweden, and professional planners, architects and urban developers involved with the project came to alight on new projects, the possibility that Malmö might find a way through its economic challenges through sustainability came to be central to the project of redevelopment. This was further accelerated with the momentum bought by national infrastructure projects which sought to literally and metaphorically bridge the Oresund and develop the rail connection between Stockholm and Copenhagen. Large-scale infrastructure spending served as a means to both convey a sense of modernity and promise to the region, whilst also bringing Malmö into close proximity with its Danish neighbour and its growing global reputation for sustainable development. As the confluence of new discourses, practices, infrastructure, interests and desires gathered around Western Harbour, the Bo01 exhibition took on the mantle of sustainability, steered in part of a group of professionals whose personal histories at Hammerby Sjostod and through other sustainability initiatives had given them experience of what it might be possible to achieve through urban sustainability principles.

Once completed in 2000, Bo01 was touted as one of the most exemplary forms of sustainable urbanism in Europe and served to leverage new flows of European funding – with the municipal government now well positioned to be a partner on numerous projects - as well as attracting international interest. While controversial in terms of the extent to which it provided an 'elite' version of urban sustainability, Bo01 and the wider Western Harbour development is equally recognised as an important example of the ways in which new forms of political economy – here focused on regional infrastructural development and the desire to position Malmö as part of the knowledge economy in the late C20th enabled new norms and practices concerning the potential for low carbon development to take hold in the city. Finding themselves at the

forefront of urban sustainability, practitioners in Malmö sought to translate and circulate elements of the Western Harbour development across the city and to enrol new elements into the project of re-making the city. Rather than being a singular accomplishment, that Malmö was a sustainable city, and specifically a *low carbon* city, needed to be continually demonstrated in order to sustain the flows of finance and political capital it had generated. Enabling this circulation required that opportunities for opening up the city to new interventions through which experimentation with the potential for marrying low carbon and urban development could take place. The privatisation of the city's energy network in 2001 (when E.ON bought a majority of the shares in Sydkraft) provided one such opportunity, not only because it brought new resources and capacities into the city, but also because it created a new space between the aims of the public authority to achieve low carbon transitions and the interests of the private utility, the German energy company E.ON, in developing 'smart' energy networks. Dependent on a large energy-from-waste production system and responsible for providing both heat and power to residents, E.ON became placed at the interface between the wastes which households produced and the energy services they required, as well as mediating the desires of the city government to enact a transition to a low carbon future. E.ON in turn came to view this conjunction as a space within which they could experiment with new forms of urban energy economy, which might provide models or lessons for their operations across Scandinavia and in Germany. These political and economic interests came into agreement through the alignment of the emerging 'smart' agenda, here primarily orchestrated through the notion of smart *infrastructure* though drawing on the heritage of Malmö's earlier engagement with the knowledge economy, with the ongoing narration and demonstration of Malmö as a low carbon city. The aligning of these agendas was formally undertaken through a contract that bound the City and its utilities to one another, configuring the climate and smart agendas in relation to one another:

"The City of Malmö has ambitious environmental goals: by 2020, the city's organisation is to be climate neutral, and by 2030, Malmö will be supplied with 100% renewable energy. Hyllie – Malmö's largest expansion area – *will take the lead in the development of a world-class sustainable city*. To shoulder this responsibility, in February of 2011, the City of Malmö, VA SYD and E.ON signed a Climate Contract for Hyllie. Under this contract, we jointly undertake to lay the foundation for Hyllie to become the Öresund region's most climate-smart city district and a *global benchmark* for sustainable urban development. When it is fully developed, the area is intended to comprise about 9,000 homes and nearly as many workplaces" (SEA, N.D., p.XX emphasis added).

It is through the on-going work of circulation and the pursuit of Malmö as an exemplar of the sustainable, low carbon city that climate smart emerges in the city. The conjunction of new infrastructure projects, the resale of the municipal utility and the opening up of development opportunities in a once neglected area of the city provides a juncture through which the 'will to improve' the city in climate change terms can be once again enacted and reconfigured. Like other 'smart city' projects we have researched, the need to be 'best in show' is central to the discourse, design and imagination of Hyllie as a 'smart' city:

Hyllie, Malmö's largest development area, is to become a global role model for sustainable urban development. Here, people will have a high quality of life, while also taking a resource-efficient and energy smart approach. Hyllie will lead the way towards Malmö becoming a sustainable city. (<http://www.hyllie.com/climate>, accessed September 2016)

Yet rather than being the product of a singular clearly articulated vision, or the rollout of a globally dominant neoliberal notion of what smart urbanism might entail, climate smart has evolved in Malmö as part of an on-going process of seeking to transform both the city's past and its future. Far from following a clearly ordained, linear pathway its emergence has been sustained through the opening up of multiple opportunity spaces in the city and the enrolling of different elements into the programme of improving the city through sustainability. This has been a matter of political economy, of the dynamic and strategic processes and configurations through which governmental programmes or hegemonic-projects-in-the-making are given form, relation and purpose through logics and the assemblage of practices (e.g. mechanisms, subjectivities)

(see McGuirk et al. 2014). Yet this is not a reading of political economy as taking place only amongst institutions, actors or their coalitions, but rather one that takes seriously the socio-material manifestation of power as always orchestrated through what we can term 'culture' "in its broad sense of the meanings that we give social life and material objects, and the concrete practices that they enable and depend on for their sustenance" (Best and Paterson 2009: 4).

Climate Smart's politics is then both a material and a cultural one, through which new forms of urban assemblage and its consequences are wrought. At work in the cultural political economy of making Malmö climate smart, we find the configuration of infrastructure, people and economies through what is usefully conceived as a trilogy of 'devices, desires and dissent' (Bulkeley et al. 2016), where *devices* "refer to the particular objects, technologies and techniques, or perhaps more precisely the assemblage of specific constellations of objects and techniques, through which everyday life ... is organised", *desires* "denote the affective and visceral dimensions of social life - hopes, fears, joy and anguish - and their embodied expression", and *dissent* includes both passive and active "forms of resistance and disengagement emerge through the working of climate's cultural politics" (Bulkeley et al. 2016: 9). In the sections that follow, we explore how attending to the devices, desires and dissent through which the configuration of 'climate smart' Malmö is in the making enables us to examine both the work of transformation and its potential.

3.2 Smart Infrastructure

The bringing into alignment of the political economies of smart urbanism and those of low carbon development depend squarely on the infrastructural nature of intervention in Hyllie. First, it has been the opening up of this fringe area of the city through the conjuncture of the 'unfinished' housing infrastructural developments in the 1970s and the national project to link Sweden and Denmark by bridge and rail through Hyllie that have created both the space and the momentum which have served to bring Hyllie into the centre of gravity for smart urbanism in Sweden. Those seeking to position Hyllie indeed suggest that it is both "close to the world, and close to home" (SEA n.d.: 2). In this sense, seemingly new discourses and interests concerned with the 'smart city' are grafted onto rather more long-standing economies of urban land, national infrastructure projects and the shifting global dynamics that shape the formation of regional economies. Being 'smart' in Malmö is only then possible because of the backbone of more traditional forms of infrastructure and investment that have, literally, laid the groundwork for experimentation with forms of smart urbanism. At the same time, the rendering of smart urbanism in Malmö is equally shaped by its instance on 'smart' as a logic through which infrastructures can be managed and new forms of efficiency and economy can be found through the integration and circulation of materials and interests that are often kept deliberately separate in the pursuit of economic growth:

"The concept for Hyllie is based on effective energy system solutions for electricity, heating, cooling and transportation. There must be a high degree of interaction between different types of infrastructure, including waste, water and wastewater. Energy that is used in Hyllie will be based on renewable energy sources or be recycled, for example in the form of biogas for transportation. There will be local production in several buildings at the same time as the entire energy concept in Hyllie will as far as possible use existing infrastructure and central production in the Malmö urban district."
(Swedish Energy Agency 2011)

The configuration of 'smart' as infrastructure relies on the articulation of desires for forms of economic fixity on the one hand – of the need for the kinds of stability and solidity that large infrastructural projects promise and frequently deliver – whilst at the same time seeking to create new dynamics through connecting diverse kinds of resources with one another in order to realise their (economic) value. Smart-as-infrastructure here is configured through new kinds of grid. Grids that are stable, enabling smooth mobilities that draw distant places into proximity. Grids that are smart, capable of working in real-time in order to match the demand for

heat and power with available resources and of enabling circular economies, which in turn provides forms of (climate) efficiency:

“The area will integrate smart grids and other intelligent energy solutions for electricity, heating and cooling. Smart grids creates flexibility in the energy system through better control and monitoring. This enables opportunities for better use of renewable and decentralised energy sources. In Hyllie, people will actively be able to measure, monitor, control and influence their own energy consumption using smart energy solutions, and be able to independently produce energy” (City of Malmö 2017)

At the heart of the configuration of climate smart urbanism, and its potential for transformation, is then a set of desires that are bound up with new imaginaries of infrastructure-grid, enabling smooth, stable flow, yet at the same time capable of being disruptive to the kinds of inert infrastructure that came to form the modern infrastructural ideal of the C20th (Graham and Marvin 2001). While such desires, for the improvement of the grid, the urban and with it the economy, through ‘smart’ are articulated in a range of discourses and sites, their configurational power is perhaps most clearly manifest in the ways in which they are expressed through a series of devices, the techniques, artefacts, and technological assemblages through which particular forms of power are put to work. Within Hyllie, experimentation with such devices is rife, manifest in the climate contract itself which binds the partners to targets and timetables for carbon reduction through their development projects, and all manner of interventions designed to rework infrastructures towards their climate smart potential. Here we might think of computer platforms and forms of storage, intended to mediate between intermittent renewable energy production and its use in households, systems of building control intended to enable large commercial offices to act as sinks/sources for heat and power in a controllable fashion, and even the electric vehicles that populate the suburban landscapes of artist’s impressions and planning diagrams which function to absorb excess power and convert it to mobility. Such devices are not only important in materially reconfiguring flows of resources, and with that creating new forms of value and interest, but also in terms of their affective and emotional quality – of rendering visible and visceral the desires imagined for the future smart city (Merricks White 2016). Interventions in the infrastructural realm are therefore not only experimenting in a technical sense, with what it might be possible to achieve in low carbon terms, but also creating a space within which what it might be like to live with our desires for low carbon futures can be demonstrated and experienced.

3.3 Climate Smart People

The infrastructural realm of climate smart Malmö is not empty, but rather intimately connected to those who will inhabit a climate smart present/future. For the planners and designers involved, “living and working in the Öresund region’s most climate-smart city district means that it should be easy to live a climate-smart life” (SEA n.d. p.4). The initiative ‘Samsyn Hyllie’ (co-vision Hyllie) brings together Malmö Stad and private developers of Hyllie. Samsyn Hyllie recently issues the magazine ‘En plats i världen’ (A place in the world), which articulates many dimensions of the quality of smart life in Hyllie. Hyllie, it is argued, has emerged as a world destination, a place for meetings and experiences, from Lady Gaga, Eurovision, and large sports event in the Malmö Arena, Skateboard World Championship at Kroksbäck, shopping at Emporia, and the Titanic exhibition at MalmöMässan Exhibition and Congress Centre. In the next few years, the intention is that 5000 people who ‘like to live a climate smart life and have good transport connections close by’ will move into Hyllie, 15 minutes from ‘the continent’. The magazine of around 100 pages focus a lot on how you can find your home in Hyllie, a house that will be climate smart and where your life will be connected and green. In a special section (‘The Residencies’) of the Magazine profiles a mother and her son, moving in in 2013, and now living the climate smart life in Roth Property Building along the Hyllie Boulevard. They are described as ‘pioneers on the plain’, where transport connection makes for an easy life and where the smart energy services become normal and easy. Radiators are gone, and underfloor heating just works. In the section on education and schools in the area, the magazine portray the Hyllievång School (with a capacity of 600 students), a school with a

commitment to learning in relation to sustainability and climate-smart solutions. The school is a passive house with solar panels on the roof, and on a screen in the main entrance, students will be able to read how much energy the solar system provides and consumes.

Seeking to instill these forms of desire in Hyllie has been a matter not only of public information campaigns and new building standards, but also of 'smart' home interventions which are marked by a specific focus on *demonstration*: of small-scale, avowedly experimental projects designed to showcase both new technologies and ways of living in smart homes (Lefevre 1994; Verheul and Vergragt 1995; Lovell 2004, 2009). In Malmö Western Harbour, Hållbarheten (2011-) was built by E-ON in the form of an eight multi family dwelling and apartment building in Malmö Western Harbour. The house, which employs a variety of heating solutions including DH, Solar PV, Biogas and Heat pumps, allow the residents to produce their own energy, monitor and control their energy consumption. Residents have access electric cars, bikes, vespas, but also an outside swimming-pool to reduce the demand for travelling on vacation. Every apartment has over 50 measuring points, continuously supplying information about temperature and energy usage with respect to both heating and electricity including a number of household appliances such as lighting or kitchen equipment. Every household is provided with an iPad with an app that monitors and can regulate the usage of energy and its costs.

Behind the veneer of the high-tech lifestyle this kind of intervention offers lies a more fundamental message about what it is that is desirable – such experiments are designed in order to provide a notion of the 'good life' that is tied to continued practices of household consumption, albeit in electric form. That a 'green life' can be a desirable, 'high end' good life where 'it is easy to do the right thing'. While the low carbon demonstration house Hållbarheten is located in the Western Harbour, its presence is circulated far beyond. It is deliberately used to demonstrate different forms of smart living, and has come to stand in for 'smart living' across Malmö. The images of people using an app to control electricity consumption, the orangerie, the pool, and the easy access to a range of electric vehicles (car, vespa, cycle) are now ubiquitous in both E.ON's and Malmö's imageries of how the climate-smart life can be lived and practiced. In this sense, one need to recognize that Hållbarheten is not just a site of economic accumulation, a technology test-bed, but a site of social and cultural reproduction of what it means to be both 'smart' and 'low carbon'.

Across the multiple forms in which 'climate smart' is being configured in Hyllie, we find little evidence of dissent, of the passive or active resistance to the project of making Malmö climate smart. Despite the continued circulation of an idea of the climate smart city as one which appeals to a consumer based and often elite notion of society, the protests that took place in the Western Harbour concerning the exclusionary nature of urban development appear largely absent. Equally, few questions are asked about how the smart city, low carbon vision for the city rubs up against the continued promulgation of a high carbon life: alongside and located centrally in the plan for climate smart Malmö icons of the high-carbon age persist – Sweden's largest shopping centre, a stadium, and large corporations engaged in the workings of the global capitalist economy. Rather than active dissent, what does arise are other imaginaries of how the urban milieu might be improved. This has not taken the form of the kinds of socially-driven movements for low carbon society that have emerged elsewhere, such as within the Transition Town movement. Nonetheless, driven by the municipal government have been efforts to link low carbon development to questions of social justice and inclusion through projects undertaken at Augustenborg to refurbish housing for energy conservation and to develop green areas in the city. This work has been driven by a vision of bringing nature back into the city, a vision which also percolates Climate Smart Malmö where measures to replicate the rich cultural and material history of the surrounding ecology through the building fabric (e.g. limestone biomes) are bought in as a means through which to address the problematic of species decline (e.g. bees). Here then, the logic of the climate smart city starts to take another turn, as new notions of resilience, the green city and biodiversity start to become attached to and circulate within the narrative, practice and configuration of the climate smart city.

4. Conclusions

The spatiality of Climate Smart Malmö is neither homogenous nor coherent, but rather multiple and heterogeneous, connecting sometimes seemingly incompatible elements into an assemblage that hangs together through the forms of relationality that are immanent to this configuration. Seen through this lens, we can say that 'low carbon' does not replace 'high carbon', but rather rubs up alongside it in an uneasy fashion, both serving to maintain strategic state/economic interests yet also requiring that the nature of these interests and how they relate both to one another and the contexts/conditions through which they are (re)produced are challenged. At the same time, 'climate smart' does not only grow in Hyllie, but takes root in multiple sites in Sweden and beyond (Lund, Stockholm, Gothenburg, Örebro, Berlin, Copenhagen to name just a few). The configuration of infrastructure, people and economies wrought through the devices/desires assembled and enacted in this cultural political economy come to be replicated and reproduced across multiple urban sites that are both at a distance and held in proximity to one another through what Barry (2001) terms a 'technological zone', fluid space formed when technical devices, practices, artefacts and experimental materials are made more or less comparable and connectable. It is not a fixed structure and it requires frequent maintenance work through regeneration, adjustment and reconfiguration (Barry 2001: 40). At work in Climate Smart Malmö, through the cultural political economy of making climate smart infrastructures, people and economies is a wider project of creating a 'climate smart city zone', in which the climate smart city comes to be a 'technology' in the broadest sense of the term, maintained, curated, standardised and reproduced across multiple sites. Climate's cultural political economies are in this sense 'topological' (Allen 2004), creating new relational spaces through practices of reach and proximity that are creating both new kinds of global circulation as well as forging particular urban places.

The case of Climate Smart Malmö opens up the question of how transitions towards low carbon economies might emerge in relation to broader processes of economic development. Here, rather than being external to the process of capital accumulation, here climate comes to be a means through which economies are being made. Climate smart emerges as sustainability, low carbon, and smart come to be discursively constituted as part of an urban problem that requires intervention and as offering the promise of improvement for the future city. Yet this is not a strategic project directed by the interests of capital and the state towards clear ends, but rather a more incremental, fragile process of 'hegemonies in the making' (McGuirk et al. 2014), in which the governmental intention to improve the city, and its understanding of itself and its future, is more improvised, operating through openings in the city emerging through other programmes (e.g. the infrastructural reconnection of Sweden and Denmark, the availability of land created through more than two decades of economic decline). This is not so much an ecological 'fix' for capitalism, as the on-going work of seeking and maintaining circulation in order to repurpose existing urban configurations into new governmental programmes whilst also bringing new entities (smart networks, desires, and imaginations of the future) into play.

It also suggests that this work of political economy is material and cultural in important ways. Climate Smart Malmö is constituted through an array of devices and desires that are bought to bear to configure people, infrastructures and economies in relation to what it means to be climate smart. This is not a coherent or smooth vision, but an assemblage that enables multiple forms of climate smart to be held together through forms of calculation, commensuration and the affordance of particular kinds of qualification – of what constitutes appropriate carbon conduct for everyday life in the climate smart city, or the aesthetics of the future neighbourhood. Climate smart is not constituted through a technological zone which is both reproduced in Malmö and serves to circulate and reinforce what a good climate smart city should contain and what it can become. It is through the making and maintenance of this technological zone that diverse strategic interests of the state and capital come both to be realised and at the same time challenged. E.ON, for example, can no longer be an energy company, but one that is required (contracted) to deliver a low carbon future for an urban community. The climate-smart-city-zone serves both as a 'safe space' in which experimentation can take place, not only in a technical sense but also politically and culturally in terms of what constitute the potential politics and economies, cultures and identities required of organisations in the context of an (urban)

socio-ecological crisis, but also a site of investment, risk and reproduction where the potential to gain from drawing this crisis into new kinds of economy serves to attract and bind new forms of socio-material configurations together.

Perhaps most importantly, it shows that the 'low carbon' economy cannot, and does not, undo all of the obduracy of the high carbon world. The climate smart city no more replaces the industrial city than Roman cities replaced those of the empires that went before them. Rather, this is the work of bricolage and intervention, of finding the interstices in the city where climate smart can be inserted and circulated, rubbing alongside high carbon urban life in often highly contradictory ways yet at the same time making space for new ways of imagining and living the decarbonised future.

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