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Realigning the electric city. Legacies of energy autarky in Berlin and Hong Kong

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ABSTRACT

Whilst cities are widely regarded as playing a pivotal role in energy transitions, recent research is highlighting the enormous variety of urban responses. This differentiated picture of urban energy transitions is helpfully opening up the debate to the multifarious factors shaping urban energy policy. What is in danger of getting lost in these powerfully 'presentist' narratives is a sense of where these urban responses are coming from and how historical legacies of energy production and use are influencing future options. This paper uses a comparative historical analysis of two iconic 'electric cities' – Berlin and Hong Kong – to explore the legacies of past socio-technical configurations for today's attempts to realign urban energy systems. It investigates firstly, how, in response to their respective geo-political isolation prior to reunification in 1990/1997, the two cities strove to maximise local energy autarky for security reasons. The paper, secondly, demonstrates how political and economic reintegration in the 1990s has initiated a realignment of each city's energy policy, as power grids become regionalised and local generation capacity questioned. We conclude by drawing implications from these historical legacies of energy autarky and regionalisation for the cities' responses to the low carbon challenge today.

1. Introduction

Whilst cities are widely regarded as playing a pivotal role in energy transitions, today and in the future, recent research is highlighting the enormous variety in urban responses to climate change [1–3]. The search for model development trajectories or institutional arrangements for the low carbon city is being clouded by stories of deviation, contestation, appropriation and adaptation peculiar to specific urban contexts and contingent events. This differentiated picture of urban energy transitions as they are really happening is helpfully opening up the debate to the multifarious factors shaping urban transitions and the challenges that emerge from them for both policy and research. What is in danger of getting lost in these powerfully 'presentist' narratives is a sense of where these diverse urban responses are coming from and how historical legacies of energy production and use are influencing (low carbon) options for today and the future.

This paper uses a comparative analysis of two iconic 'electric cities' – Berlin and Hong Kong – to explore the legacies of past socio-technical configurations for today's attempts to realign urban energy systems. The selection of these two cities is informed in part by their symbolic status as pioneers of the modern electrified city. Berlin was Europe's "Electropolis" of the 1920s and 1930s, being home to Germany's powerful electrical industry but also to innovative urban illuminations and lighting festivals [4–6]. Hong Kong was among the first cities in East Asia to have electric street lighting, in 1890, and has since become a model for safe and reliable power provision in the region and an icon for its illuminated skyline [7–9]. Beyond their global symbolism as 'electric cities' the two cities are distinctive because of their unusual histories of autarky of power generation. Both cities have a long experience of being self-sufficient for their own power supplies and having to (re)configure their electricity systems around their own urban territory. This was the case in West Berlin between the blockade of 1948/1949 and German reunification in 1990 and in Hong Kong under British colonial rule until its handover to China in 1997 and – to a significant extent – still to this day. For primarily geopolitical reasons, West Berlin and Hong Kong sought to secure their power supplies by maximising urban energy autarky and limiting dependency on their regional neighbours: East Germany and mainland China. Since reunification in the 1990s, Berlin has had to re-align its electricity system to take account of the reopening of borders, the introduction of competition and processes of economic and political integration with surrounding regions. In Hong Kong, reunification with China did not alter its high level of autarky in power generation significantly but has made grid connections to,

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and electricity imports from, China the subject of growing debate [10,11]. Its electricity market remains in the hands of two de facto monopoly utilities, although liberalisation has been under discussion since 2006 [12–14]. These energy transitions from urban autarky to regional integration – in the form of rapid re-alignment (Berlin) and gradual rapprochement (Hong Kong) – are accompanied by more familiar policy objectives to reduce carbon emissions, minimise energy use and increase energy efficiency through shifts in electricity generation and use.

The energy histories of these two cities inspire the following research questions, to be addressed in this paper:

- Firstly, how did West Berlin and Hong Kong strive to render their electricity supply systems more autarkic in response to their geopolitical isolation and to what effect?
- Secondly, how have the two cities been realigning their electricity supply systems following reunification in the 1990s?
- Thirdly, how far and in what ways are their historical legacies of energy autarky framing options for energy transitions today?

The paper is conceived not merely as a comparative case study of two 'electric cities' and their historical legacies, but also as a contribution to broader debates on energy autarky, energy security and urban energy transitions. In terms of the avenues for social science research set out in this journal [15] the paper works at the interface between the politics, geographies and histories of energy. It explores the impact of geopolitics on urban energy systems and the energy security strategies that have emerged in response to infrastructure isolation and subsequent integration. It highlights the spatial dimensions of these strategies, as exemplified in the reconfiguration of electricity networks around the territorial confines of the city. It also advances knowledge on the history of urban energy by illustrating how far and in what ways past events and trajectories influence today's energy systems and their prospects for transition.

We begin by introducing relevant scholarly debates, identifying research needs pertinent to the empirical cases and exploring ways of working at the interface between the approaches presented (Section 2). In the subsequent two empirical sections we investigate, firstly, how, in response to their respective geo-political isolation prior to reunification in 1990/1997, the two cities of West Berlin and Hong Kong strove to make themselves autarkic in terms of solely local electricity generation, building up capacity for energy self-sufficiency (Section 3). We subsequently demonstrate how political and economic reintegration in the 1990s has initiated a realignment of each city's energy policy, in which power grids either have been (Berlin) or are being (Hong Kong) regionalised and local generation capacity questioned (Section 4). In the following section we discuss how these historical legacies of energy autarky and regionalisation are influencing the cities' energy transitions today (Section 5). We conclude by summarising the principal findings and reflecting on their relevance for debates on urban energy transitions in general and on energy autarky and energy security in particular (Section 6).

2. Urban energy transitions: discourses of autarky and security

Much of the literature on energy transitions is, perhaps inevitably, loaded with normativity. Most studies are underpinned with value judgements about the environmental unsustainability of existing energy systems, assumptions about the inherent benefits of alternative sources of energy and preferences for particular forms of governance, such as decentralised power networks or community energy projects. Recent contributions on urban energy transitions by human geographers, political scientists and sociologists have helped rectify the powerful normative thrust of energy transitions research [1–3,16]. Their interest in how energy transitions develop in particular urban contexts and their epistemological roots in critical and institutional analysis sensitise these scholars to the problems encountered by, and through, energy transitions in practice. From this corpus of work we have learned, for instance, that energy transitions in cities do not follow a model or linear pathway, they are often highly contested, they tend to overlay, rather than replace, existing modes of energy provision and use and they can generate negative impacts of their own. This literature can, however, be criticised for its strongly 'presentist' perspective on urban energy transitions, focusing on current attempts to promote low carbon cities and relegating the historical legacies of urban energy systems to introductory contextualisation. This research deficit is met to some extent by scholars of urban environmental history and the history of technology who have explored earlier energy transitions, for instance from wood to coal, from gas to electricity or from municipal to national power utilities [4,17]. What is still missing, though, is research spanning these two bodies of literature, i.e. studies capable of explaining how the history of a city's energy system is influencing today's energy transitions. This kind of work can be about the path dependence of predominant structures or logics of energy provision in a city, about historically rooted cultures of energy use, about critical events in the recent past (e.g. blackouts) which have influenced subsequent management strategies or about entrenched dependencies of a city on energy imports.

In this paper, we offer an illustration of this research potential by setting the ongoing energy transitions in Berlin and Hong Kong in the context of their recent urban energy histories. What makes this endeavour particularly intriguing is that both cities are adapting to a very different kind of transition to their energy systems; namely, the reintegration of their insular urban networks into regional and national electricity systems. In the case of Berlin, technical networks have been re-connected, new organisational structures created, regulatory regimes altered and resource flows redirected. In the case of Hong Kong, such processes of infrastructural and market integration are ongoing. Yet, at the same time, elements of the old autarkic electricity systems still remain entrenched. This offers an excellent opportunity to study processes of reconfiguration – or reassembling – of urban energy networks in a city's recent history, observing which elements change and which do not. It also allows us to investigate not just one energy transition in each city, but two, exploring how today's attempt to pursue a low carbon agenda for each city is constrained or assisted by its legacy of autarky, concerns over energy security and steps towards spatial reintegration.

These issues of energy autarky and energy security in connection with shifting energy geographies resonate with several strands of recent academic debate on (urban) energy transitions. Energy autarky, as discussed in the context of the current energy transition debate, is conceived most frequently in the normative sense of a programmatic vision [18]. According to Müller et al., an energy autarkic region is one that relies on its own energy resources to sustain society in the region ([18; p.5801]). They define autarky not simply in terms of self-sufficiency of supply but also regarding the energy source (e.g. renewables from the region, rather than carbon energy imports), the decentralised structure of the energy system and increased energy efficiency on both the supply and demand side [18; p.5802]. The related term energy autonomy is also prevalent in the literature, most prominently advanced by Scheer [19] in his popular eponymous book (2007). For him, energy autonomy is similarly oriented around decentralised models of renewable energy systems, although with a focus on autonomous initiatives taken by individuals, local communities or investors. Used normatively in this way, both terms are geared to mobilising support for a particular kind of energy autarky. However, this literature does not reflect critically on the assumptions underpinning the connectivity