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# The historical–geographical construction of power: electricity in Eastern North Carolina

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This paper examines the production of the uneven landscape of electricity in Eastern North Carolina using a historical geographical materialist approach. In particular, it traces the development of infrastructures designed for both the mass generation and consumption of electricity using archival sources that include oral histories, newspaper reports, and corporate documents. The electric utilities and related infrastructure that have emerged are an important contributor to the energy poverty and uneven economic development that plagues the region. I argue that exploring the historical–geographical construction of electricity in this way brings forward a number of considerations for conceptions of energy poverty and energy justice.

**Keywords:** energy justice; electricity; historical–geographical materialism; North Carolina; energy poverty

## Introduction

One kilowatt hour of electricity in the tiny town (population 500) of Hobgood, North Carolina (NC) costs $0.18. If the average house uses 1000 kWh per month, it means the average monthly electricity bill of a house in Hobgood is $180. In Rocky Mount, the closest town of any size to Hobgood, the bill would be $140. And in the rural areas surrounding Hobgood, the bill would be about $114 (see Figures 1 and 2 for locator maps). These can be compared to an average cost of $105 per month across NC, and an average bill of $118 per month for the USA as a whole (United States Energy Information Administration 2012a). While across 1 month the differences in these bills appears minor, over months and years this difference can represent a significant burden for low-income households.

The differences in electricity bills arise due to the different types of electric utilities that operate in NC. These can be divided into three categories. First are large investor-owned utilities, such as Duke and Progress Energy, which primarily serve large population centres. Second are rural electric cooperatives like those that provide low-cost electricity to the areas around Hobgood. These were formed with help from New Deal-era legislation designed to spread the availability of electricity to rural areas across the USA. Finally, municipally owned systems, like those in Hobgood and Rocky Mount, provide electricity to their citizens, much as they would water and sewage service. In NC, more than 70 municipalities perform this service, serving over 500,000 people (NC Public Power 2009). The electricity market in NC is not deregulated; customers do not have a choice between providers. Each type of electric utility in NC has a specific non-competitive service territory,

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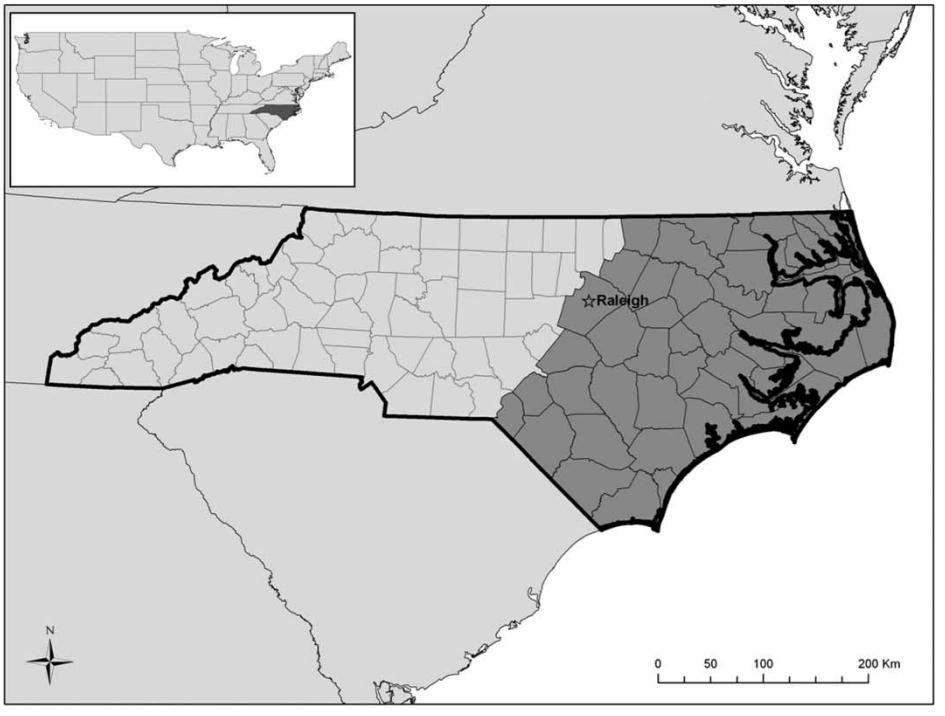


Figure 1. Eastern NC locator map.

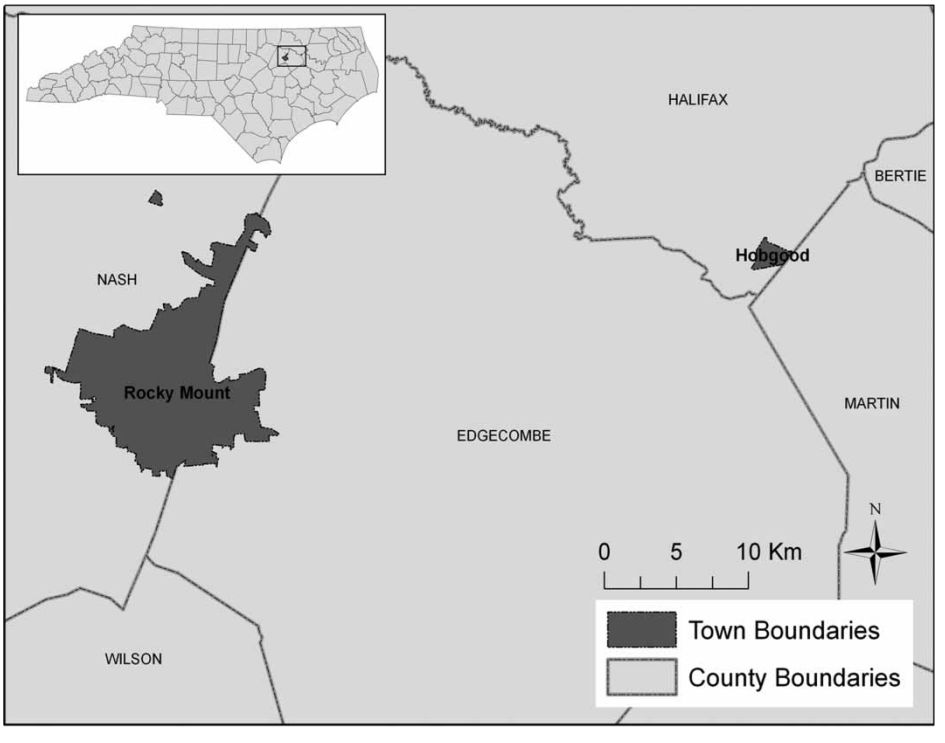


Figure 2. Hobgood and Rocky Mount locator map.

faces varying levels of regulation from a state utilities commission, and has the ability to charge different electricity rates.

These increased electricity rates have left many households facing electricity bills so high that they are unable to heat and cool their homes to a comfortable and safe level, a situation called energy poverty (Harrison and Popke 2011). Yet, it is not only expensive electricity that leads to energy poverty, rather it results from a range of factors and relationships, including the sources and types of household energy, the energy efficiency of a given home, and the unique circumstances individuals and groups face in order to stay comfortable in their home (Healy 2004, Buzar 2007a, Walker 2008, Boardman 2010, Harrison and Popke 2011). Conceptualising energy poverty in this way helps to highlight its contingent nature. Instead of treating it as a fixed concept measured by incomes and expenditures, it is the way the various aspects of a household's daily life interact with their material surroundings that leads to more or less vulnerability to energy poverty. Among the contingent factors not always fully considered are the historical–geographical foundations of energy poverty. These can include, for example, investigations into why certain houses were built with little insulation or why certain health conditions cluster in particular places, both situations that may require additional energy for treatment and care. Of particular importance is the historical–geographical construction of energy production and distribution systems in particular geographic settings and scales, the institutions and corporations that operate those systems, and how high rates of energy consumption have been encouraged and subsidised by these energy producers. The mix of these factors can effectively form a "trap" – that is, a situation in which households find it difficult to escape high electricity rates and patterns of high electricity consumption (Buzar 2007b).

Prior investigations into energy poverty in Eastern NC have largely left open the question of why a fairly small geographic territory is served by a variety of electric utilities operating under vastly different conditions and charging vastly different prices (Harrison and Popke 2011). Further, questions remain as to the historical–geographical factors that contribute to North Carolinians currently consuming electricity at a rate nearly 18% higher than the national average (United States Energy Information Administration 2012b). To come to grips with energy poverty in Eastern NC, I argue that it is crucial to more fully understand the contours of these two interrelated questions: why do some North Carolinians use so much electricity, and why are some North Carolinians charged rates much higher than others?

The variance in cost can largely be attributed to an investment made by Hobgood and Rocky Mount, along with a group of 30 other Eastern NC municipal electric utilities, in the Shearon Harris nuclear power plant. The Shearon Harris plant (whose planning and construction phase lasted from 1970 to 1987) was jointly funded by these towns and Carolina Power and Light (CP&L), an investor-owned utility. Massive construction cost overruns left investing towns heavily indebted and forced to charge exorbitant electricity rates to pay down their debt. But, while the current high electricity prices in the investing towns can be traced to this moment, there are a number of unanswered questions that remain. Why did these towns choose to invest in this project? What were the historical and geographical circumstances that drove electricity generation to this particular technological solution, and how was consumption of electricity made to match the tremendous electricity generation capacity? What conditions limit the ability of people in Eastern NC to adapt to these high electricity rates, and what does this mean in terms of energy justice?

To address these issues, I examine the development of electricity in several Eastern NC towns starting in the early twentieth century. Drawing on the emerging literature on energy in historical–geographical materialism, I argue that the electricity system in NC developed, working in conjunction with the state, by finding ways to encourage the mass consumption

of electricity to match its increasing production. What emerged as a stable configuration between electric utilities, consumers, and the state began to unravel in the 1970s, and a new arrangement developed that ultimately led to higher electricity prices and high levels of debt in some Eastern NC towns. What remained, however, was an infrastructure geared towards mass production of electricity, and a group of customers whose electricity consumption had been cultivated and encouraged for many years. These related factors have left many people in Eastern NC facing the conditions of energy poverty. As a result, I argue that to achieve any semblance of energy justice in NC, the current system of unequal electricity pricing in Eastern NC must be understood in terms of the historical and geographical contexts in which it emerged.

## Energy and historical–geographical materialism

Historical–geographical materialism starts with the viewpoint that historical transformations and processes are knowable and explainable based on material conditions, and that historical change should be understood as arising from contradictions embedded in the mode of production. While the mode of production can be defined in quite narrow terms that focus solely on commodity production and exchange, Kirsch (2009) argues that our conception of production should be expanded to include the social, political, and cultural forms and institutions that are essential to the production and reproduction of capitalism as a process. By broadening our definition of production, historical–geographical materialism can develop into something more akin to an approach for examining "the active construction and transformation of material environments (both physical and social)" (Harvey 1984, p. 6), a method that interrogates how space "acquires meaning, significance, resonance, even a particular form in and through the multiple relations with which it is infused and through which it becomes produced" (Swyngedouw 1999, p. 94). This broad conception recognises that the reproduction of capitalism, which requires the production of a range of social, political, and cultural geographies, is the driver of the production of various uneven landscapes of development through processes that are neither static nor neutral. These uneven spaces are, in turn, essential to the reproduction of capitalism over time, and at times subject to alternating rounds of investment, disinvestment, and creative destruction (Smith 2008).

This leads to one of Marx's (1990) key points: capital is not a static entity, rather it is a process made up of the flows, circulation, and movement of a variety of social actors, entities, and materials. What David Harvey's work has made clear, however, is that at the same time there is great movement and flow, there is also the need for circulating capital to be transformed into material objects. This is among capital's central contradictions: it has a simultaneous need for both circulation *and* spatial fixity (Harvey 2006, 2010). Analysis of these fixed objects allows historical–geographical materialism to be used as a methodology. By beginning an analysis with objects that are real and exist, we can begin the process of analysing the relationships and processes that are embedded in them (Swyngedouw 1999). In other words, we must start from the realisation that current conditions are the result of historical processes and relations.

A growing body of literature is examining issues of energy from an explicitly historical–geographical materialist framework (see for example Bridge 2010, Labban 2010, Zalik 2010). As Huber (2009) points out, however, much of this literature is focused on conflicts of distribution and issues surrounding the extraction of fossil fuels. In arguing for a historical–geographical materialism more attuned to the role fossil fuels play in the realm of capitalist production and circulation, Huber (2009) makes two important points. First, he argues

that "the literature must move from conceptions that understand energy as a 'thing' or a 'resource' towards a conception of energy as a 'social relation' enmeshed in dense networks of power and socioecological change" (2009, p. 106). In other words, electricity needs to be considered not solely as a "neutral" stream of electrons that powers homes, machines, and factories, but rather as the material evidence of past labour, social, and ecological processes and capital accumulation strategies. Second, Huber argues that the mass production of energy, and the mass production of commodities that it enables, is only possible if it is met with mass consumption. As the work of Nye (1998) has shown, the rise of the mass consumption of energy by Americans during the twentieth century brought about a fundamental reshaping of both the city and countryside. This is evident not only in the physical landscapes of highways, suburbs, and increasingly large houses, but also in the ideologies surrounding the "right" to an energy-intensive way of life (Huber 2009).

These two points form the central framework for this paper. First, energy, in this case electricity, must be treated as more than a thing. The web of social relations in which electricity and electric utilities are enmeshed is critical to the ways electric utilities develop, expand, and price electricity. As Kirsch and Mitchell (2004) point out, "things" (in their case, machines) are not solely inanimate objects, but rather bearers of past labour processes. In this sense, the streams of electrons that flow through distribution wires, and the prices that are charged for the use values they provide, are representations of past labour processes, past accumulation strategies, and past power struggles. For this reason, it is necessary to continually question the historical–geographical developments that led to the current high electricity prices in Eastern NC.

Second, the production of ever-larger power plants should not only be viewed as a quest to produce landmarks of modernity and progress (though this was certainly part of it, see Kaika (2006) on dams and Howell (2011) on Michigan's electricity landscape). It was also part of a strategy by investor-owned electric utilities to increase revenues and profits by consolidating control over the production of electricity. However, mass production of electricity is not enough. Once generated, electricity is difficult to store in bulk. This means that electric utilities must make an immediate match between the production of electricity and its consumption. At the same time, massive coal and nuclear power plants are difficult to turn off and on, meaning they must be run as close to full time as possible. As such, the rise of electricity production capacity, which enabled the potential for economies of scale that electric utilities found so attractive (Howell 2011), necessitated that electricity consumption must be increased as well. Electric utilities took numerous steps to make this happen, and in what follows, some of the steps electric utilities in Eastern NC took in order to boost power consumption to a level almost a third greater than the national average are described.

With these two points providing a theoretical framework, in the next section I will briefly describe the study area of Eastern NC in order to provide the context in which electric utilities developed. I will then trace the origins and development of the types of electric utilities (investor-owned, municipally owned, and rural cooperatives) starting in the early twentieth century until the 1990s, focusing on their development, organisation, and financing. This leads to a tracing of the move towards the mass production of electricity by building bigger plants, followed by an examination of the strategies utilities used to increase consumption. The unravelling of these standard strategies occurs alongside the decision to build the Shearon Harris nuclear power plant, which effectively bound the electricity supply of citizens served by municipally owned systems with the success of the plant. In the conclusion, I argue that the failure of this arrangement brings forward important considerations when considering energy justice.

## Eastern NC

Since the colonisation of the Americas, the southern portion of the USA has had a distinctive economic geography, both in terms of the productive industries that were common there and the labour relations that emerged from those industries. Even after the abolition of slavery after the American Civil War, the issue of race was at the forefront of both labour and production processes, creating a unique set of conditions and economic developments (Badger 2007). The economy of Eastern NC is embedded within many of these same social relations.

In the post-Civil War period, agriculture in Eastern NC remained the principle industry, as most freed slaves, along with many poor whites, worked as tenant farmers. Most industrial development occurred in other parts of the state, in large part due to the region's lack of waterpower. Changes in technology, particularly in steam power, allowed for slow changes in the location of industrial development in the USA (Nye 1998), and industry slowly moved into the region. Aside from the region's physical geography, much of this uneven development can be attributed to the preferences of the powerful in the region, whose wealth was predicated on the existence of poor, disenfranchised, segregated, and uneducated African Americans and whites (Badger 2007).

Social relations in the South had remarkable obduracy (Woods 1998). Change appeared imminent several times in the South, especially during Reconstruction; yet again and again the ruling elite moulded federal policies to their benefit, first by allowing legal segregation (Wilson 2005), and later adjusting New Deal policies to reaffirm existing social relations, conditions held in place by both intimidation and violence (Badger 2007). In one such case, local governments allowed welfare payments from the federal government to be suspended during the summer months so that a reserve labour force could be formed to assist during planting and harvest times. This had a dual effect for planters: they could keep wages low due to the lack of other forms of payment in the summer while also absolving them of any responsibility for the well-being of their employees during winter months (Badger 2007).

Despite the lack of change in social relations, the first half of the twentieth century represented a period of tremendous economic change in Eastern NC. Developments in steam power and increasingly efficient coal-mining operations in nearby Appalachia allowed manufacturing, in search of lower wages and less union activity, to begin moving into Eastern NC. Around the start of World War II, technological developments were mechanising agriculture, and in combination with farm consolidation thousands of tenant farmers were "freed" from the land, leading to the mass migration of African American workers off farms and into towns and cities (Woods 1998). While low wages initially attracted industry to the South, as federal minimum wage laws were put into place southern states and towns were quick to make other concessions in the forms of subsidies and tax breaks. It is important to note, however, that not just any industry was welcome; southern elites aggressively courted non-unionised industry (especially textiles), a point that the state Chamber of Commerce was eager to promote (Minchin 2005). It is under these conditions that three distinct types of electric utilities developed in Eastern NC.

## Electric utilities in Eastern NC

### *Investor-owned utilities*

In his book *Consuming power*, Nye (1998) describes how the rise of the corporation enabled the rapid industrialisation and spread of power throughout the USA. Initially, stock-issuing corporations could only be created via a special act of the state legislature,

"a privilege . . . granted only for the construction of facilities that would clearly benefit the general public" (Nye 1998, p. 104). Restrictions on the formation of corporations gradually loosened throughout the nineteenth century, and by 1900 corporations of all kinds were in existence. Energy, in the form of fossil fuels and electricity "came largely under the control of large corporations" (Nye 1998, p. 122), as unlike power drawn from human labour or water power, these forms of energy could more easily be transported over long distances (Huber 2009).

The corporation allowed stock to be issued to generate capital to finance large infrastructure projects. Electric Bond and Share Company (EBASCO), a utility holding company giant based in New York City, owned and built CP&L, an electric utility that ultimately powered much of Eastern NC. EBASCO was formed by General Electric in the early twentieth century essentially to help sell more electricity-generating equipment (Hughes 1993). As early local utilities struggled to obtain operating and investment capital, they were often unable to pay for the electricity-generating equipment they needed. General Electric often took local utility stock in lieu of payments, but this stock was initially of little value. EBASCO was formed to advise local utilities on engineering, marketing, and operating issues in order to boost their value. Local utilities initially paid only a consulting fee to EBASCO, but EBASCO quickly began taking a financial interest in the operating utilities through a variety of intermediary companies. A convoluted pyramid structure of ownership emerged that was highly leveraged, with success or failure largely based on stock price (McGuire 1990, Hughes 1993, Friedlander 1996).

NC-based CP&L took advantage of capital flows and booming utility stock prices during the early and mid-1920s to quickly expand its system, serving nearly 100 communities directly with retail power, with an additional 29 served at wholesale by 1926 (Fletcher 1938). The development of CP&L was helped immensely by state regulation, which served to stabilise the industry by effectively guaranteeing profits, thus increasing its attractiveness to investors (Hausman and Neufeld 2002). At this point, NC's electricity service was largely concentrated around towns and cities in central NC (Riley 1958), but CP&L's sights were firmly set on growth into small towns in Eastern NC, many of which were served by small municipally owned electric utilities.

### *Municipally owned utilities*

Municipally owned electric utilities began forming in NC as early as 1877, and typically were limited to providing street lighting (Kuhlman 1941). As generation and distribution technologies diversified, municipal electric utilities began providing lighting for private homes, businesses, and commercial establishments. The case of Rocky Mount, NC is instructive in understanding the origins and growth of municipal electric utilities.

The 1890s saw a rapid increase in municipal electric systems in the eastern part of the state, and in 1898 the Supreme Court of North Carolina ruled that communities wishing to raise funds using bond issuances needed special state legislative authorisation to hold local referendums to approve plans for the issue of bonds (Beck 2002). The members of the Rocky Mount Board of Commissioners, which included the most prominent businessmen in the city, sent a delegation to the General Assembly in Raleigh to gain authorisation for the bond referendum. Once holding a referendum was approved, the funds for the construction of a power plant and distribution lines were shrewdly tied to funds for a popular new sewage plant and the first public school in the town. The referendum passed nearly unanimously (Rocky Mount Board of Commissioners 20 March 1901). In spring of 1901, the town selected a bank to manage the bond issuance, and hired

prominent local contractor (and occasional member of the Board of Commissioners) D.J. Rose to build the plant (Rocky Mount Board of Commissioners 13 June 1901). Two generators were purchased from General Electric, and on 1 January 1902 the coal-fired plant went into operation. By 1908, however, the demand in the rapidly growing town had outstripped capacity and the plant was replaced with a larger coal-burning unit. It was upgraded in 1917, and again in 1924 to match the rapidly increasing electricity demand in the town (Beck 2002). These upgrades were funded by additional municipal bond issuances, and the revenues from the electric utility soon became an important part of local governments. In what became a common practice, "surplus" revenues from the electricity funds could be moved to the general fund and used for other purposes. While it was argued that this practice kept property taxes low, it would later prove a difficult (and costly) habit to break.

As municipal utilities were developing within their own city limits, CP&L was building larger power plants and developing more effective long-distance power transmission capabilities. In August 1926, general manager Paul Tillery of CP&L made their aspirations clear: "Many of the larger towns of Eastern North Carolina have for years been without sources of power supply other than small municipally operated steam plants" (Riley 1958, p. 191). This, Tillery argued, put industry at a disadvantage, as they need the assurance of continuing expansion of the power supply, regulation of rates charged, and most importantly in CP&L's case, "to deal with privately-owned enterprises rather than those that are municipally-owned and politically-managed" (Riley 1958, p. 191). Tillery was bold enough to name CP&L's takeover targets, a series of municipally owned electric systems:

> The power companies are in position to serve the Eastern Section of the State and are now knocking at the door. Power transmission lines are being extended to Rocky Mount, Tarboro, Wilson, Scotland Neck, Enfield, Elizabeth City and Edenton, and these cities and towns will for the first time have the potentialities of future development. (Riley 1958, p. 191)

Tillery and CP&L's aspirations did not come to fruition, however. The town of Rocky Mount, for example, rebuffed CP&L's offer to purchase their municipal system in 1928, but did allow for an interconnection between the two systems in order to obtain a source of backup power (Beck 2002). This interconnection would later prove important, but as the stock market crashed in 1929, EBASCO's holding company empire came crashing down. CP&L was subject to a Federal Trade Commission investigation into financial irregularities, and its stock price suffered to the extent that it paid no dividends between 1933 and 1936 (Riley 1958). Unable to fund further growth and acquisitions, CP&L's territory was from this point largely fixed.

Initially considered only a luxury good, electricity emerged during the 1920s and 1930s as a key to modernising the nation. With investor-owned electric utilities unpopular during the 1930s due to their prominent role in the Crash of 1929, alternative ideas about how to spread electricity emerged (Brown 1982). One of the most effective was the Rural Electrification Administration (REA).

### *Rural electric cooperatives*

In 1935, only 3.2% of farms in NC had electricity, compared to 11% at the national level (Brown 1982). Rural areas in NC were considered undesirable to investor-owned utilities due to lower expected profits, but with the federal government eager to take a more

active role, rural electrification emerged as an important part of the New Deal to spur economic development in depressed rural areas. The REA and rural communities in Eastern NC quickly mobilised and began forming rural electric co-ops with the assistance of low-interest federal loans, as well as technical, accounting, and organising expertise from the REA (Brown 1982). Rural electrification was a great success – by the late 1950s nearly all farms in Eastern NC had electricity. In many cases, the cooperatives continued to look to expand their reach into new neighbourhoods and communities that were developing, a move that would cause considerable controversy.

Rural cooperatives in NC were primarily involved in the distribution of electricity. Most of the power was bought wholesale from investor-owned utilities, like CP&L. CP&L's expanding customer base, which now included rural cooperatives buying power wholesale, in combination with technological improvements in power plants after World War II (Hirsh 1989), led CP&L to embark on an aggressive programme of power plant construction.

## Building bigger plants

In describing the various elements that shaped the development of the electricity landscape in Michigan, Howell (2011) cites the key role state regulatory control played. What is made clear is that both state utility commission oversight and utility profitability have historically been based on capital expenditures, and not necessarily on the actual revenues received from electricity sales. This means that the price electric utilities charge for a unit of electricity is not determined by its cost of production, but rather on the capitalisation of the utility. This, in combination with strategies designed to increase electricity consumption (which will be discussed in the section that follows), is what Hirsh (1989, 1999) refers to as the "grow-and-build" strategy that utilities employed for much of the twentieth century. The grow-and-build strategy led to a constant cycle of plant construction activity in which "utilities would seek rate increases to cover short-term revenue shortfalls and use the money to service outstanding debt, all while increasing the supply of electricity (through new construction) and further depressing its price" (Howell 2011, p. 966). These same dynamics were at work in Eastern NC, and are especially evident in the CP&L's actions between the period of 1940 and 1965, during which they built increasingly large plants in order to obtain dominance over electricity production in Eastern NC, including providing wholesale electricity to municipal and rural cooperative systems.

The dominance of CP&L over electricity production arose from both technological reasons and an active campaign to limit the capacity of municipal and cooperative utilities. In terms of technology, CP&L's more extensive service territory and customer base enabled it to take advantage of the increasing efficiency of coal-fired power plants. By building increasingly large plants, CP&L was able to sell electricity for prices that continually declined between 1940 and 1970. Municipalities, on the other hand, were limited to selling electricity within their municipal boundaries.

In 1941 there were 80 municipalities in NC selling electricity to their residents. These towns were small; 55 of the 80 had populations below 2000. About one half of these municipalities produced their own electricity, with the remaining buying power from nearby municipalities, purchasing wholesale power from private utilities, or if located near federal dam projects, buying power from the federal government (Kuhlman 1941). Over the next 30 years municipal plants were gradually closed as it became cheaper to buy wholesale power from the private utilities, a shift that agglomerated capital and production capabilities into fewer hands. If located in Eastern NC, municipalities increasingly bought their power from CP&L. In the aforementioned Rocky Mount, which interconnected with

CP&L in 1928, the decision to close their power plant occurred in 1963, though the town continued to own the distribution lines, resell power to its customers, and retain revenues after the cost of wholesale power was excluded (Beck 2002).

Ongoing during this same period was CP&L's active campaign to limit the ability of rural electric cooperatives from building their own electricity production capacity (Carolina Power and Light 1962). The success of co-ops in rural parts of Eastern NC and the resistance of some municipalities to their acquisition by CP&L eventually set these two "public" forms of power against CP&L, a "private", investor-owned utility. This battle, fought in NC and across the USA, was to last from the late 1930s well into the latter part of the twentieth century. CP&L's position in this fight was personified by their general manager for most of this period, Louis V. Sutton. In the corporate biography of CP&L, Sutton is portrayed as the ardent defender of "private industry as opposed to socialised power" (Riley 1958, p. 225), and a man whose "personal instincts forewarned him of the government infiltration into the private power business" (Riley 1958, p. 220).

What Sutton was ultimately concerned about, however, is how technological advancements would ultimately enter the electricity marketplace. As Howell (2011) makes clear, CP&L and other investor-owned utilities needed to consistently increase the efficiency of power plants in order to maintain their profitability and industry status quo. This "utility consensus", as Hirsh (1999, p. 11) explains, describes the tacit agreement made between investor-owned utilities and society: in exchange for being granted a "natural monopoly", investor-owned utilities were given access to non-competitive service territories in return for providing state-regulated, reasonably priced electricity and good service. The term natural monopoly was used to designate industries in which large technological and investment thresholds blocked entry into low margin markets, barriers that kept "perfect" competition from occurring.[1] Some of these industries, it was argued, would operate best if granted monopoly franchises in which economies of scale could be realised. The utility consensus had the effect of giving utility managers considerable power, as regulatory commissions were, with some exceptions, unwilling or unable to challenge the path of growth the utilities had designed for themselves (Hirsh 1999).

In order to maintain these positions of immense power, utility managers sought to decrease outside influences on the electric system as much as possible. The rise of the rural cooperatives, federal power agencies, and municipally owned systems always held the potential to disrupt the utility consensus. In NC, CP&L drew much of its power from water resources whose access was under federal control. With the rise of federal power agencies such as Tennessee Valley Authority, the federal government became involved in building large hydro plants, later constructing coal-fired and even nuclear plants. The electricity generated by these stations was often extremely cheap due to their tax-exempt status and availability of low-interest federal loans. This bothered CP&L's Sutton to no end, as he asserted his position that "it is perfectly obvious that government ownership or municipal ownership is fundamentally wrong and unsound; for, in the first place, it is not the function of government to do anything that the citizen can do better" (Riley 1958, p. 221).

Sutton became part of the highly organised industrial group, the Edison Electric Institute, which attempted to undermine public power at every opportunity. Among these practices was the building of spite lines, that is, quickly constructing transmission lines into rural communities that had begun organising electric cooperatives. Further tactics included a large-scale advertising campaign that linked the development of public electric utilities, and federal support for their operations, with socialism. Despite their aggressive efforts against the quickly developing rural co-ops, CP&L sometimes argued that rural people simply were not interested in electricity, even going so far as to depict rural people as

backward by referring to their "interest [in] these strange surveyors and wire stringers" (Riley 1958, p. 244). To the rural electrification boosters, this was evidence of CP&L's anti-rural bias, and their preference for harvesting "the cream", that is, areas ripe for profits, rather than providing universal service.

For CP&L's Louis Sutton, keeping the flow of technology solely in the private sphere was of utmost importance, particularly considering the growing significance of CP&L's wholesale business to their profitability. Through their control of electricity production in Eastern NC, CP&L's power plants were growing increasingly large and efficient. Nationwide, utilities were achieving unprecedented popularity, profitability, and power in the mid-1960s (Hirsh 1999). However, in order for this tremendous growth in power production to be effective, an equivalent growth in power consumption was needed.

**Producing electricity consumers**

If electricity was to be produced on an increasingly grand scale in order to realise economies of scale, all of the electricity also needed to be consumed. As Howell (2011) point outs, narratives of "progress" helped to guide electricity's development. These include the progress of the electricity infrastructure itself, as evidenced by the increasingly large power plants, as well as progress in terms of electricity use transforming everyday lives. The spread of electricity into NC's rural areas can be viewed as part of a state-led modernisation effort aimed at a particular type of progress during the early and middle parts of the twentieth century. Kaika and Swyngedouw (2000) argue that during "early modernity" large technical infrastructures were the symbols of promise of progress and emancipation, particularly in the sphere of the home. Public water works, electric generation stations, and transmission wires were evidence of human ingenuity and of a future in which the burdens of household chores would be cast off and replaced by leisure and self-improvement. The development of these structures were mirrored by emerging discourses revolving around health, cleanliness, and safety, new attitudes and requirements that were "progressively incorporated into a nexus of architectural and regulatory structures to produce a new spatial order in the modern city" (Gandy 2006, p. 503; see also Miller 1983). Key among the technologies that enabled the shift to a sanitary city, and thus a sanitary home, was electricity. Technologies specifically aimed at cleanliness, including vacuum cleaners, dishwashers, and electric hot water heaters, all became ubiquitous within American homes during the middle of the twentieth century. Electric utilities attempted to use these discourses revolving around health, cleanliness, and safety in order to speed the movement of electricity into homes, a move they hoped would boost electricity consumption, bring about modernisation, and in the case of investor-owned utilities, boost profits.

The role of electricity in the rise of a culture of mass consumerism in rural areas, as well as the household in general, cannot be overstated. Morris Cooke, an early leader of the REA, made clear his objective: "Our big job is to build up the psychology of generous use of electricity – a few lights in a home is not rural electrification . . . Really to electrify rural America we must adopt every possible means of building up its use" (Kline 2000, p. 178). To ensure that power was used for more than lighting, some co-ops required homes to have a number of outlets wired in order to be connected to the grid. Electric appliance dealers often sat on co-op boards, using their position to increase sales of electric appliances. Another tactic of increasing electricity use was the establishment of monthly minimum charges that encouraged households to use at least a certain level of electricity each month (Kline 2000).

Electrification created a tremendous demand for electric appliances, many of which were sold by the utilities themselves through an army of home economists, door-to-door salesmen, and agricultural engineers. Agricultural engineers and home economists demonstrated the many uses of electricity on the farm at county fairs and annual cooperative meetings. As one co-op member stated,

> home demonstration agents held meetings, and many of the housewives attended those meetings. They were given all kinds of modern advice about the use of electric equipment and of course the housewives were very much interested and responded very rapidly and graciously. (Interview with Hubert R. Prevatte by Rose G. Prevatte, 19 June 1984, interview D-0033, in the Southern Oral History Program Collection #4007, Southern Historical Collection, Wilson Library, University of North Carolina at Chapel Hill)

There were also frequent meetings of homemakers clubs started with the assistance of the co-ops. One member of a homemakers club described the typical meeting:

> We learned how to use electricity, and also our electric ranges and equipment that we'd bought. As long as finances would let us, we'd put in new electric equipment. They were very helpful about teaching us how to use and to care for it. (Interview with Fredda Davis by Ruth Dasmann, 26 September 1984, D-0012, in the Southern Oral History Program Collection #4007, Southern Historical Collection, Wilson Library, University of North Carolina at Chapel Hill)

These demonstrations did much to position the current methods of farming, cooking, and cleaning as insufficient and backwards, with electricity positioned as the way out of this drudgery.

While rural cooperatives were using a variety of methods to increase the use of electricity in households, CP&L general manager Louis Sutton was also tinkering with electricity rates. A 1932 study of electricity rates in NC noted with some annoyance that CP&L charged an astounding 50 different electricity rates, all designed to find optimum rates to boost electricity consumption (Waddell 1932). Sutton not surprisingly described these rate formations as "inducement rates", which in his words would provide "the biggest savings in unit costs . . . to the customer who increased his use the most" (Riley 1958, p. 214). After the introduction of the inducement rate in 1934, the average *per capita* use of electricity increased 26% over the previous year. In 1936, rates were again lowered, and in combination with the aforementioned aggressive merchandising plans the average household used 1020 kWh annually, a full 50% above the average usage in 1934. Rates were decreased again in 1936, and over the next 34 years, CP&L's electric rates were either stable or decreased from the previous year.

Starting in the 1950s, CP&L embarked on a quest to create "all-electric homes". These houses would come equipped with electric appliances in the kitchen, electric clothes washers and dryers, and would be heated, and later cooled, with electric heat pumps. To accomplish this, CP&L worked closely with local property developers, providing financial incentives for each all-electric home that was constructed. For CP&L, the project was an immense success – during the 1960s, nearly half of all new house starts in their service territory was all-electric, and by the early 1970s nearly all new apartment buildings were all-electric. These efforts were bolstered by hosting an annual Space Conditioning Seminar, an event that brought together 200 architects and building engineers from across NC to learn about the latest in electrical heating and cooling (Carolina Power and Light 1964).

The combination of changing standards of cleanliness and health, the aggressive marketing of electric appliances to households and particularly women, and the aggressive rate

setting led by Louis Sutton combined in such a way that by 1958, NC had among the highest *per capita* usage of electricity in the USA (Riley 1958). By the late 1960s, CP&L proudly reported that residential customers in their territory used 31% more electricity than the national average (Carolina Power and Light 1962). As noted, boosting profits by increasing consumption was one wing of CP&L's profitability strategy; the other was decreasing costs through technological advances. By 1970, CP&L had a near monopoly on power production in Eastern NC. If people did not buy electricity directly from CP&L, they bought it indirectly through rural cooperatives or municipal systems, which purchased the power wholesale from CP&L. Wholesale sales of electricity to municipal and cooperative systems represented 10.6% of CP&L revenues by 1970, making it an important part of their business (Carolina Power and Light 1970). Overall, consumption of electricity had increased alongside production, and CP&L remained bullish as it entered into the 1970s, forecasting 10.5% annual demand growth over the coming years (Carolina Power and Light 1965). These forecasts required that the massive construction programme already underway be increased even more.

### *Changing electric fortunes in the 1970s*

Despite CP&L's upbeat assessment for their future growth, in the late 1960s a series of problems began to appear on the horizon for the electric utility industry. Ecological limits appeared as most prime hydropower options had been exploited, and there was growing concern regarding the environmental damage caused by coal-fired power plants. At the same time, technological stasis had set in among electric utilities – the thermal efficiency of steam-generating plants plateaued around 40%, and bigger plants were no longer offering increasing economies of scale (Hirsh 1999). Further ecological limits appeared due to the particularities of coal production, which meant that miner strikes could cause severe price disturbances and shortages (Mitchell 2009). Labour unrest in Appalachia during the 1960s and 1970s exposed the limitations of coal-fired plants, and nationwide many utilities were opting to build oil-fired plants to meet additional capacity needs, though this switch was short-lived (Hirsh 1999). These factors coincided with the energy shocks of the 1970s, and with fuel prices skyrocketing and profits falling, many utilities increased electricity prices for the first time. Coupled with a burgeoning environmental movement that was recognising the negative ecological impacts of coal plants, a technological shift to nuclear power became attractive to utilities. In theory, nuclear offered a lower, and infinitely more stable, fuel price. In addition, nuclear technology appeared scalable in many of the same ways as other generation technologies, seemingly restoring the utility consensus that appeared to be failing.

In this setting, CP&L began investigating the construction of nuclear power plants in the late 1960s, including what would become the Shearon Harris nuclear power plant. Planning for the project was significant, and became increasingly difficult as the utility consensus unravelled during the 1970s. While electricity demand continued building in NC, environmental restrictions and higher interests rates meant that across the USA the cost for building new power plants increased from $147 per kilowatt in 1970 to $678 per kilowatt in 1978 (Hirsh 1999). Rising fuel prices were also causing CP&L great distress, to the extent that Shearon Harris, Chairman and CEO of CP&L (and for who the nuclear power plant would be named), stated that without being able to increase electricity rates in 1974, "we simply would have gone out of business in the fourth quarter" (testimony before the Committee on Public Utilities and Energy 1975). Utilities across the country were

struggling for cash. Bill Lee, Chairman and CEO of Duke Power, the other large investor-owned utility operating in NC, said of the period:

> We were not able in 1974 to sell bonds at any price, under any conditions whatsoever. We were desperate for cash to meet the payroll . . . We converted everything we could to cash. We converted uranium to cash. We sold our office buildings and leased them back. (Testimony in Rate Hearing, 9 July 1985)

The issue of reliable power in the future had also become a real threat. By the early 1970s municipalities in Eastern NC were purchasing their entire power supply from CP&L, and wholesale prices increased 530% between 1970 and 1982 (Research Triangle Institute 2000). Fearing rising costs and projected electricity shortages, municipal power companies determined that getting back into the generation business would enable them to better control their prices and supply. Municipalities believed that this could be accomplished by either building their own plants or buying into those of private utilities. The issue was taken before the North Carolina General Assembly, and in 1975 the Joint Municipal Power and Energy Act was passed, which allowed municipalities to jointly finance, develop, and operate electricity-generating facilities. Two years later, a statewide vote approved a constitutional amendment that would allow for joint public–private ownership of electricity generation. At this point, 51 municipalities joined together, 32 of which were located in the eastern part of NC, forming North Carolina Eastern Municipal Power Agency (NCEMPA) in 1978 (Research Triangle Institute 2000).

A year after NCEMPA was created, the partial reactor meltdown at Three Mile Island occurred, and the federal government reacted with stringent new safety regulations and design changes that drove up construction costs in subsequent years. While nuclear construction projects all across the country were struggling for completion (Cook 1985), CP&L needed financing in order to push ahead with Shearon Harris. In July 1981, after years of trying to keep "public" power out of generation, CP&L agreed to sell NCEMPA a 16% share in a nuclear power project near Raleigh. Historical events had conspired to make CP&L unable to raise the funds needed for their projects, and their public power opponents, who had reasons of their own for wanting back into generation, had provided the capital needed to complete the project.

Nuclear power was proving a difficult model for the utility business to master. The industry largely treated nuclear as just another way to create steam, and attempted to rapidly scale up smaller nuclear plants, a practice that ignored the complexity of nuclear generation (Cook 1985, Hirsh 1999). With the added costs incurred in the aftermath of the Three Mile Island disaster, construction costs skyrocketed, with some utilities paying as much as $1 million a day in interest on unfinished nuclear plants (Cook 1985). After years of construction delays, the Shearon Harris nuclear power plant, which included only one reactor, came online in May 1987, and had a final bill of $3.9 billion, which was $2.8 billion more than the initial cost estimate. By 1999, after a series of poor financial management and planning decisions (which included continuing the practice of moving electricity "surplus" into the general fund), the combined debt of the municipalities was $5.6 billion, which amounted to 28% of all public debt in the state of NC (Research Triangle Institute 2000, Stith 2001). Perhaps most troublesome is the nature of this debt, which is not backed by tax revenues, but instead must be paid back solely from the sale of electricity, meaning the "true liability for all of the . . . debt resides with the electricity consumers of the member cities" (Research Triangle Institute 2000, p. 30). Though Progress Energy (which merged with CP&L in 2000) owns the vast majority of the Shearon Harris plant

(84%), they are able to spread that debt across a larger number of customers as well as numerous other plants constructed during the 1960s that have long since been paid for. As mentioned in the introduction, electricity rates in the investing municipal systems are now on average 42% higher than those charged by Progress Energy, and 35% higher than NC as a whole (ElectriCities of NC, Inc. 2010).

## Conclusion

Eastern NC's electricity system until the early 1970s evolved in a context not unlike much of the US South. In electricity generation, CP&L followed national trends in technology and management, but also developed in relation to local municipal systems and rural co-ops. Both public and private utilities employed ideologies of progress and emancipation to boost electricity consumption to levels higher than most of the USA in order to match the production of electricity in increasingly large plants. By the late 1960s and 1970s, significant challenges to utilities were appearing on multiple fronts: social, ecological, and technical. The supposed technological fix to these problems, nuclear energy, proved an expensive one, leaving the investing towns deeply indebted, with their citizens paying electricity rates far higher than in neighbouring towns. These factors have left many people more vulnerable to energy poverty in Eastern NC.

This paper has implications for how nascent scholarship on energy justice is conceptualised (see Hall this issue for an in-depth discussion). As Shirani *et al.* (2013) point out, much of the discourse surrounding issues of energy involves looking forward – what is our ethical responsibility to future generations? As the papers in this special issue make clear, conceptions of energy justice in the present tense are already subject to a variety of different demands, ranging from how the parents of children adapt their consumption (Shirani *et al.* 2013) to ideas of status and prestige (Hards). Considering the ways that possibilities for energy justice are accentuated or limited by the historical construction of the current electricity system adds another dynamic that must be considered. What the story of Eastern NC calls to bear is that questions of energy justice must also address the past constructions of energy, and how those may be limiting the current conditions and choices for ethical and sustainable consumption. With this in mind, what is our ethical responsibility to those who have been affected by the historical development of electricity in NC?

As Hall (2013) points out, the ability to choose the electricity provider in the UK allows some (albeit at times limited) control over one's electricity situation. While there is no ability to choose your electricity provider in Eastern NC, market liberalisation and electricity deregulation has largely been a failure in the USA and has tended to increase electricity prices. Further, the twin capitalist imperatives of promoting mass production and mass consumption were key drivers in creating a situation in Eastern NC; thus, it is difficult to envision an acceptable market-based solution to this problem. Yet, these continue to be suggested, most recently by a study commission organised by the North Carolina General Assembly, which strongly advocated selling the generation and distribution assets of the municipal systems to one of NC's investor-owned utilities (Municipal Power Agency Relief Committee 2012). Such a scenario would represent a clear case of accumulation by dispossession for the investor-owned utilities (Harvey 2004): during a period of financial instability for private industry, the state steps in with needed financing, only for the assets to be sold back to private industry at a later date. This would occur after citizens in the towns involved had paid up to $240 million more for electricity each year than others in the state, and also paid off nearly $1.5 billion dollars in debt (Municipal Power Agency Relief Committee 2012).

What must be considered, I would argue, is a broader notion of energy justice that considers how both the production and consumption of electricity were historically produced. If the high electricity bills and high electricity consumption of the energy poor are to be put in their historic and geographic contexts, so must the actions of the state and the electric utilities that helped produce them.

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## Note

1. For an in-depth discussion of the development of the term and usage of "natural monopoly", see Mosca (2008).

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