LEGACIES OF ELECTRIC RESTRUCTURING FOR A New Electric Transition: Neoliberal Paths for Canadian Hydropower

Eve Vogel
University of Massachussets Amherst

ABSTRACT
The current transition in our electric systems away from fossil fuels is shaped by a previous electric system transition, electric restructuring. Can the neoliberal tools we built some two decades ago—and the regulatory remnants and responses—achieve the deep environmental and social change we now seek? This article analyzes the institutional, political-economic, and geographical effects and legacies of electric restructuring, focusing on Massachusetts and New England. It analyzes five realms of change: (a) generation; (b) transmission; (c) distribution and retail supply; (d) regional wholesale markets; and (e) deregulation of electric utility corporate structure. It shows how the legacies of these changes shape Massachusetts's approach to importing Hydro-Québec power. Today's main market tools in the electric sector are inadequate to fund long-distance transmission in the United States, as investors cannot tolerate the high financial risk. Massachusetts's approach to importing Québec hydropower unfolded in four steps: 1) the 2016 Energy Diversity Act; (2) a Request for Proposals to fund a transmission line through northern New England; (3) the selection of a winning proposal, and 4) the addition of clean energy credits to the state renewable portfolio standard. These put the cost of a new line onto Massachusetts's electric customers, guaranteed profits to the transmission owner and the state's still-regulated utilities, and offered multiple income streams to Hydro-Québec. The proposal competition favored projects that externalized costs onto other people and places, and into the future—leading to political opposition, escalating costs, and implementation delay. This history helps reveal key legacies and limits of electric restructuring and its role in decarbonization as well as wider sustainability and justice.

Key words: electric markets, energy geographies, infrastructure, Hydro-Québec, Massachusetts, neoliberalism

I. Introduction: A Current Energy Transition Built On The Legacies Of Electric Restructuring: Neoliberal Paths For Climate Mitigation?

Today, as activists call for an energy transition away from fossil fuels, they increasingly call for that transition to rest on commitments to social and environmental justice. A large focus for that effort is in the electric sector: changing from fossil fuel electric generation to use of renewables and other low-carbon sources; and then switching other sectors like transportation and heating to electricity. Yet many of the tools, institutions and markets that are available to promote a fuels transition in electricity were created or reshaped by another transition in the electrical system which happened only a couple decades ago: electric restructuring. Though this previous electric system transition is most accurately called restructuring, the word "deregulation" that is often used flags the broader context: electrical restructuring was part of a global trend of neoliberalization, in which economic activity was commodified, deregulated, privatized, and/or marketized.

This article aims to contribute to the special issue by detailing why and how electric restructuring is key background to understand Massachusetts's drive to import Hydro-Quebéc power. To do this, I analyze of several institutional, political-economic, and geographical effects of electric restructuring. Electric restructuring unfolded in the United States, Massachusetts and New England largely between 1978 and 2005. I illuminate how these changes and their effects have shaped the political alliances, policy choices, financing, and some of the likely outcomes of Massachusetts's effort to import Hydro-Quebéc power as one strategy to meet its greenhouse gas reduction targets. In the process, I also illustrate many of the ramifications of electric restructuring that so far have been largely missing from the literature.

As a host of geographers have shown (e.g., Robertson 2007; Mansfield 2009; Castree 2011; Lave and Doyle 2021), the very act of commodifying and marketizing any kind of biophysical resource can have unintentional and often negative effects. In the case of a ubiquitously used resource like electricity, market price affects the rhythms of extraction, commerce, manufacturing, work, consumption, and waste in myriad places, communities, and ecosystems. All this happens often with little attention to local sustainability or wellbeing. Further, neoliberal instruments and approaches often change who can influence electric policy and markets, and to what ends, while obscuring those effects behind a veneer of a naturalized market. Competition and deregulation are portrayed as opening access to a variety of market entrants, but they are often promoted by those who hope to achieve market dominance through early entry or other means.

As Harvey (2007) and many others have shown, neoliberalism was intended to "fix" a growing crisis of accumulation of the 1970s, in which business owners and investors had an increasingly difficult time finding places to invest capital where they could reliably earn a profit. Electric restructuring, with its new markets and investment opportunities, was a way for large electric consumers to reduce costs; for utility corporate families to alleviate limits and restrictions on potential profits; and for investors to open a whole new world of profitable opportunities in new generation technologies, new electric market commodities, and a range of electric services (see e.g., Hirsch 1999; Borenstein and Bushnell 2000; S. N. Isser 2003).

Recognizing that the current transition was built on a previous one with strong neoliberal foundations raises the question: As we collectively push for a profoundly urgent reduction in carbon emissions, can the neoliberal tools and institutions we have built in the electric sector achieve the deep environmental and social change we seek?

This article does not pretend to answer that question fully. My goals here are narrower and more empirical, laying groundwork for further analysis. Focusing on one state and one region, I ask what, exactly, electric restructuring did—in terms of institutional, political-economic, and geographical change. I then outline some important implications for Massachusetts's current effort to import a large block of Hydro-Quebéc power under the state's 2016 Energy Diversity Act.

Massachusetts has long been a leader in efforts to reduce the environmental impacts of its energy generation and use; it has relatively strong commitments to social justice principles including access to and affordability of electric power; and it was also a leader in electric restructuring. For these reasons, for those interested in just social and environmental change in our energy systems, it is an excellent place to examine the legacies of electric restructuring. The direct and tangible connections between Massachusetts policy and Quebéc's hydropower also enable close tracing of some of the material, social and environmental linkages, as illustrated throughout this special issue.

To orient the reader and provide background, I provide a short overview of some of the literature on energy geographies, electric grids and markets, and a brief policy history of electric restructuring. The two main Parts of the article follow, Part II on New England electric restructuring and its consequences, and Part III on the implications for Massachusetts's imports of Hydro-Quebéc power. In a concluding Part IV, I ask what some of the lessons about how we think about the legacies of electric restructuring as we seek and analyze a new electric transition.

Geographies of Electric Grids and Markets

In recent years geographers have produced a robust energy geographies literature (for overviews see: Huber 2015; Calvert 2016; Harrison and Popke 2017; Bridge et al. 2018). They have helped illuminate the ways that energy geographies are changing and contested across a host of scales, locations, technologies, and policy and market contexts. Bringing geographers' insistence on connecting the theoretical with the concrete, they have shown the ways that broad ideas like an energy transition, renewable power or climate mitigation are linked to capital accumulation strategies, state strategies and apparatuses at multiple levels and scales, and environmental and social exploitation and change. Geographers have traced these interlinkages through to specific policies, technologies, locations, environments.

Few geographers have thus far, however, undertaken deep explorations of electric policy and history, especially not at the scale of grids and regions. Connor Harrison has been one geographer who recently has led the way, examining early twentieth century electric history, and most recently, the accumulation strategies within the current U.S. electric system (Harrison 2013b; 2013a; 2020; see also Heiman and Solomon 2004; E. Vogel 2008; 2012; Howell 2011).

Others have written about electric restructuring and its legacies, but often from an engineering, economic or political science standpoint (e.g., Joskow 2003; Borenstein and Bushnell 2015; S. Isser 2015; Litvinov, Zhao, and Zheng 2019). This article aims to bring the analytical strength of geographical scholarship, within and beyond the energy geographies literature, to these topics. I ground my analysis in geographers' and allies' long insistence that neoliberalism is not a single thing; rather, there are many neoliberalisms, and to understand their effects, one must delve deeply into empirical specifics, tracing a host of variations and path dependencies (Brenner and Theodore 2002; Castree 2011; Heynen et al. 2007; Mansfield 2009). My treatment of restructuring here is about specifics far more than generalizations.

In this paper I am particularly interested in those large-geographic-scale regional and even subcontinental electric systems sometimes called "the grid" (Bakke 2017; Cohn 2018). I have been particularly inspired by historians' and historical geographers' long and detailed expositions of the development and consequences of infrastructural systems, whether electrical systems, energy infrastructure, waterworks, and railroads and roads, that act to move and metabolize a host of resources across space (Hughes 1983; White 1995; 2011; Gandy 2002; Coutard and Rutherford 2015; Jones 2016). How the electric grid is governed, how its products are bought and sold, who owns and controls these products and their movements—all of these have enormous influence on lives and spaces in all corners of this continent. And in the last 25 or so years, many regions of the United States and Canada have fundamentally altered how their regional grids are governed.

An Abbreviated Policy History of Electric Restructuring in the United States and New England

Electric restructuring came relatively late and piecemeal in the United States, compared to restructuring in other sectors. This is because electricity was a complicated commodity for a number of reasons, including: it could not be stored; it could be bought and sold only where there were existing transmission lines; both the buyers and the sellers of electricity were politically and economically powerful; there were large and expensive "stranded assets," i.e. power plants with already-invested capital that might no longer be competitive in a freer market; electricity was recognized as essential for all people and therefore selling strictly based on ability-to-pay would not be politically viable; and electricity was regulated by fifty states as well as the federal government (U.S. EIA 1996; 1998; Hirsch 1999; Borenstein and Bushnell 2000; S. N. Isser 2003; S. Isser 2015; Joskow 2003; Heiman and Solomon 2004).

The first step in Unites States' electrical restructuring was the federal 1978 Public Utilities Regulatory Policies Act (PURPA). PURPA allowed a few small independent generators to be established. This began to crack open the monopolies of electrical utilities as well as the assumption that the electric sector needed to be vertically integrated (Hirsch 1999). There was no major electrical restructuring legislation in the 1980s, but in Massachusetts and New England, utilities, large industrial customers, environmental groups and regulators began to collaborate and negotiate, creating innovative approaches to promote conservation and efficiency, reduce costs, and plan regional electrical expansion on an integrated basis (Cohen 1987; NEES and CLF 1989; Raab 1994).

The heart of electric restructuring policy change happened in the 1990s. The 1992 federal Energy Policy Act (EPAct 1992) allowed still more independent generation. In 1996, the U.S. Federal Energy Regulatory Commission (FERC) issued Orders 888 and 889 requiring open-access transmission, which would allow any company's electricity to flow on a given transmission line. These 1996 FERC Orders also encouraged the formation of regional Independent System Operators, or ISOs, that would manage regional generation and transmission in competitive and open-access systems (U.S. EIA et al. 2000; U.S. EIA 1996; 1998; The Electric Energy Market Competition Task Force 2007). In 1997, the New England Power Pool created ISO New England and the region's first competitive wholesale markets (NEPOOL and ISO-NE 1998).

Support for restructuring varied among the fifty states. In New England, with some of the country's most expensive electricity, five of the six New England states passed restructuring legislation in 1996 or 1997 (Vermont was the exception). State Restructuring in these five states required or encouraged investor-owned electrical utilities to sell off their generation assets and reorganize their transmission assets into independent corporate affiliates. It allowed competitive retail supply and created Renewable Portfolio Standards (RPS) in which retail suppliers had to get an increasing percent of their generation from renewable sources (Polestar Communications & Strategic Analysis 2003; 2006; Wadsworth 1997; Reishus Consulting 2015).

Often overlooked or underemphasized in histories of electric restructuring was a major deregulatory shift in electric utility corporate structure, geography and finance. Driven by their falling profits, electric companies and investors called for release from restrictions on their investment opportunities. The Public Utility Holding Company Act of 1935 (PUHCA 1935) had kept utilities tightly restricted in geography, corporate form, and speculative investments since the Great Depression. It was first weakened in 1978 with the Public Utility Regulatory Policies Act (PURPA), further weakened with the Energy Policy Act of 1992 (EPAct 1992), and fully repealed by EPAct 2005 (APPA 2005; Congressional Research Service 2006; Bolton and Rosenthal 2016).

II. Institutions And Consequences Of Electric Restructuring In New England

This part of the article analyzes key effects of electric restructuring in Massachusetts and New England. I focus on fundamental institutional changes and their political, economic and geographic repercussions. I organize this part by the three main components of a traditional vertical utility: generation, transmission and distribution. To these I add two overarching changes in the electric sector: ISOs and regional markets, and changed corporate structure.

a. Generation: Independent Power Producers

The first key change wrought by restructuring was the creation and growth of independent power producers (IPPs), sometimes called merchant generators or competitive power suppliers, in the place of utility-owned generation plants. In most of the United States, including New England, vertically integrated, state-regulated, investor-owned utilities owned generation, transmission and distribution throughout most of the twentieth century. An independent power producer is not owned by the local regulated electric utility, but rather by a separate company. An IPP owner's goal is to sell the plant's generation—and, as other markets have been developed, other commodities like renewable energy credits and capacity—at the highest price it can (Wadsworth 1997; U.S. EIA 1998; Hirsch 1999). Under the new system, owners and investors spend money to build an IPP and then recoup costs (if they can) through competitive markets and contracted sales. The change to the new system is illustrated in Figure 1.

Prior to restructuring, utilities earned profits under a system often called *rate-of-return regulation*. Under this system, utilities reported their investment costs to state utility commissions, and were usually allowed to set their customers' prices, or electric *rates*, to cover the costs plus a profit. Utilities spent more money, built more infrastructure, and earned more profit—virtually guaranteed. Under this system, regulated utilities were incentivized to continually build large plants, connect them to demand centers with ample transmission lines, and then promote electrical demand to follow (Hirsch 1999 called this the "utility consensus.")

Many of the realized benefits of electric restructuring came from the rise of IPPs. Smaller and more efficient power generation plants proliferated, most of them natural gas combined cycle plants. A number of the large coal, oil and nuclear plants previously owned by utilities closed. This fuel shift, and continued investments in energy efficiency and conservation, were the largest sources of Massachusetts's greenhouse gas reductions for its Clean Energy and Climate Plan targets for 2020 (see Silverstein and Autery, this issue). Equally important as a success of electric restructuring, the direct financial risk of building new generation is on shareholders, not electric customers (U.S. EIA 1996; 1998; Hirsch 1999; Joskow 2003).

Often less remarked upon, the proliferation of IPPs also changed the political balance of power in electric policymaking in New England (and elsewhere). IPPs themselves constituted an entirely new set of political players. In New England, many of the IPPs are represented by the New England Power Generators Association (NEPGA), which has grown to be an economically and politically powerful trade organization. Additionally, large industrial and commercial electric customers, organized in trade associations such as Associated Industries of Massachusetts (AIM) and The Energy Consortium (TEC), gained new leverage over electric power policy. They had always had sway, because owners and investors could threaten to leave New England for other regions where electricity costs were lower (see e.g., E. Vogel and Lacy 2012; Koistinen 2013). As electric restructuring proceeded, manufacturers could compel electric policy change without having to move; they could simply threaten to abandon utilities by purchasing electricity directly from new IPPs. This threat in the 1990s helped convince utilities and others to support restructuring (NESCOE 2015a).

To synopsize, the rise of IPPs led to a successful shift from large utility-owned, customer-financed plants to smaller, more efficient, investor-financed plants. With this came a shift to gas generation and a resulting reduction in greenhouse gas emissions. IPPs became new political and economic players; industrial and commercial customers gained further power.

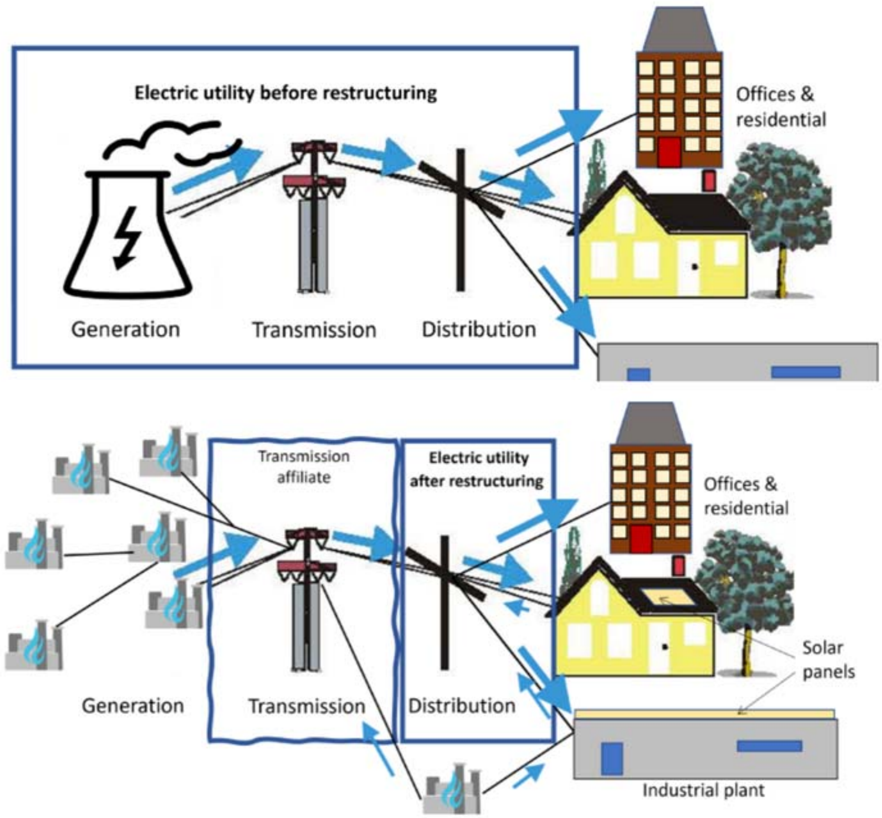

Figure 1. Massachusetts investor-owned electric utility before and after restructuring, showing unbundling of generation, transmission and distribution, and the rise of IPPs. Only distribution remains a state-regulated utility, though transmission is generally still owned by the same parent company. Most of the IPPs are efficient combined cycle gas plants, while most coal plants have shut down. An industrial plant receives wholesale power directly from one of the gas generation companies. The industrial plant and the residential house also now have photovoltaic solar panels that produce electricity that is sent into the grid. Adapted by author from U.S. EIA et al. 2000 Fig. 2, p. 9. Natural gas icon from Oregon Department of Energy.

b. Transmission: Open Access But Not Open Geographies

A second key change under electric restructuring was that transmission was required to become open access with "nondiscriminatory" pricing, i.e., equally accessible and the same cost to anyone who wanted to transmit electricity. However, transmission itself could not easily become competitive. The change in transmission, and lack of change, exemplify the complexities of neoliberal restructuring in practice, and its material and geographical consequences.

Transmission lines are the long-distance and medium-distance higher-voltage lines that carry electricity between cities or other relatively distant locations. Transmission lines are like pipes carrying drinking water from scattered reservoirs to myriad cities and towns. The higher voltage lines are like bigger pipes and carry more electricity. A map of New England's electric grid is provided in Figure 2. Different colors and thicknesses of the lines represent different voltages of the wires. Virtually all transmission lines in New England are on alternating current (AC) which allows electricity to flow freely anywhere in the interconnected grid, from any location of supply to any location of demand. As can be seen in the map, in some places, there may be a web of transmission lines so that electricity that cannot access one transmission line can flow along a different route. Figure 2 makes evident that much of southern New England—Connecticut, Rhode Island, and Massachusetts, extending into southeastern New Hampshire—fits this description. Even so, some connections are better than others—for example, Rhode Island is far more connected to Massachusetts than to Connecticut. In more remote locations, including in much of northern New England, especially if one wants to transmit high volumes of electricity, there may be only one route available.

Before restructuring, transmission lines were controlled by the local electric utilities and the regional parent "holding companies" that owned them (more on holding companies later). Transmission pricing was regulated by the Federal Energy Regulatory Commission (FERC), but the costs were bundled into utilities' cost basis they took to state regulators. In other words, transmission pricing and profits worked under the same rate-of-return system as for generation investments, but with a federal regulator involved as well: utilities invested in infrastructure, regulators approved these costs plus a percentage return, and companies profited.

In the first two-thirds of the twentieth century, integrated utilities built many transmission lines to get their newly developed generation to market. Sometimes, such as when they built larger plants than their own customers and/or local networks could use, they built interconnections so they could sell power to other utilities. However, the historic utility-by-utility construction of transmission lines left bottlenecks where electricity generated in areas of high supply may not always be able to reach neighboring areas of high demand. Transmission investments slowed in the latter part of the century as utilities' costs continued to increase and electricity demand did not.

Some nondiscriminatory transmission tariffs developed under the New England Power Pool (NEPOOL), which organized itself after the Northeastern blackout of 1965 (NEPOOL 2002). FERC orders in the late 1990s made nondiscriminatory pricing mandatory and universal, and New England states' restructuring from the late 1990s to the 2010s required investor-owned utilities to separate out transmission portions of their business into independent affiliates.

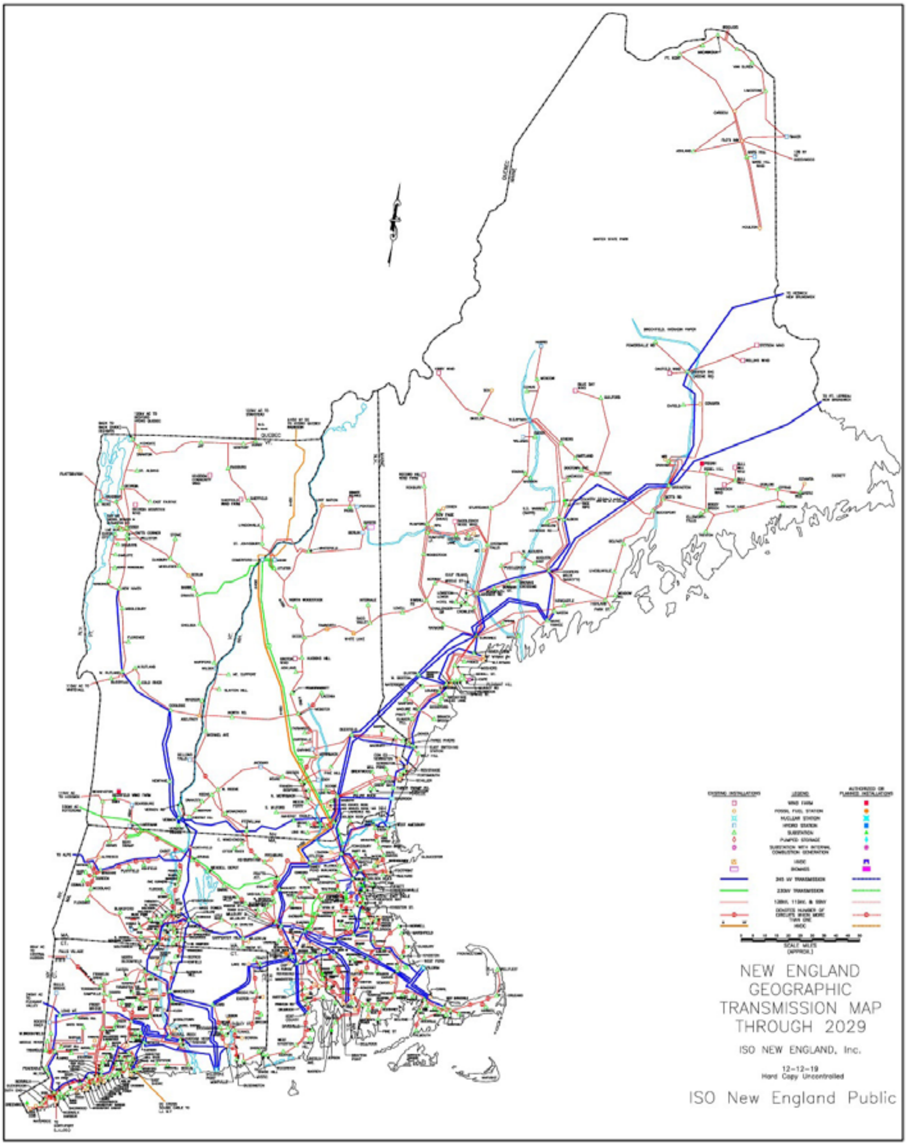

Figure 2. New England's transmission grid, including lines planned out to 2029. Source: ISO-NE 2019a. Permission granted; image provided on an "as is" basis.

Figure 3 summarizes a geographical understanding of some of the changes that resulted from restructuring, including transmission.

Open-access transmission was essential to competitive electric markets because it made competition among generators possible. Competition with equal access to the market is necessary to be an interchangeable commodity – and access to the market includes the physical ability to get to market buyers. Only if different generators could get their electricity onto the same grid and be able to send their electricity to the same set of locations and customers could they be competitive (Joskow 2003). To make transmission open-access, transmission services also had to be separated more clearly as their own commodity—different from transmission's previous role as one part of the formerly vertically integrated product of generation, transmission, and distribution.

However, for several reasons, commodifying transmission services and making transmission open access did *not* create competition among transmission providers. First, there is generally only one transmission line on any given route. Also, because building transmission is expensive, companies have rarely invested in new transmission infrastructure without a guarantee of revenue. And, once transmission lines are built, some kind of cost- and revenue-sharing among those who use the same transmission lines is essential because of the physical properties of interconnected electrical wires running alternating current (AC): electrons flow freely.

Indeed, in many ways, transmission in New England has become more *collective* since restructuring—though perhaps collusive would be a better word, as transmission planning and funding are largely controlled by a limited group, the region's transmission owners. Cost and revenue allocation are now controlled by FERC-approved agreements developed by the region's Participating Transmission Owners and ISO New England. Under these agreements, if the ISO and transmission owners agree that a new transmission investment is essential to meet the ISO's regional plan, the line is approved, and the costs can be put onto utility customers' bills under a more regionalized version of rate-of-return funding (ISO-NE n.d.f, n.d.h; Participating Transmission Owners 2005).

Transmission investments have risen significantly since restructuring, especially in regional congestion zones and areas of new demand (ISO-NE n.d.g). However, virtually all the approved transmission projects are for reliability—that is, essential transmission investments that ensure the grid functions as expected under a variety of circumstances. Reliability improvements have helped make the grid more resource-efficient and thereby reduced carbon emissions. They have also provided reliable sources of profit for existing transmission owners and their utility corporate families. However, long-distance transmission lines offer the potential for even more dramatic efficiencies and carbon reduction, because of the ability to balance out different kinds of renewable generation and different timing of electrical generation and demand, across multiple climates, landscapes, and time zones. But long-distance lines are almost impossible to fund through the ISO's regional planning and cost-sharing systems. This has to do with the power of existing transmission owners, and their utility affiliates, in ISO decision making. There are provisions for regional funding of within-region transmission for market efficiency or public purposes (see e.g., ISO-NE 2019b; Saravanan 2020), but these provisions are rarely if ever used (Jacobs 2019; 2021; Roberts 2021). FERC attempted to incentivize inter-regional lines in 2010

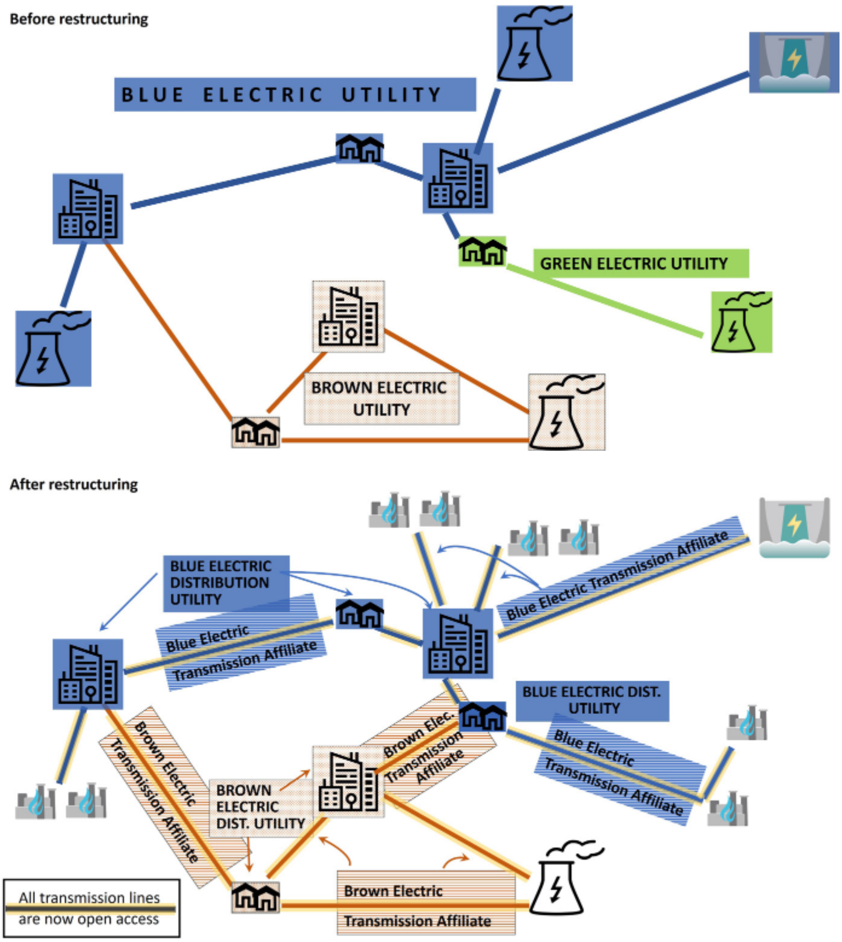

Figure 3. Electrical institutions and geographies before and after investor-owned transmission lines become open access. Before restructuring, each utility owned a generation plant and transmission lines, and each served a number of towns and cities. After restructuring, generators are now IPPs (no background color), most of them natural gas plants; and transmission lines are now open access with a non discriminatory tariff (indicated with yellow outline). Electricity now travels on any transmission line for the same "postage stamp" transmission fee. This allows all the generators in the region to compete with one another to provide the power that will be delivered to end-use customers, regardless of location or ownership. The utilities still control local distribution, and utility affiliates own transmission lines. A few short new transmission lines have been able to be funded, to improve reliability. The diagram also shows a consequence discussed later in the paper, further mergers and acquisitions, in which Blue Electric has bought Green Electric. Figure by author. Natural gas and hydropower plant icons from Oregon Department of Energy.

with Order 1000, which encourages competitive interregional interconnections that can be allocated to two regions' customers. However, garnering sufficient approvals for transmission lines under Order 1000 has proved time-consuming and difficult, and ISO-NE has yet to see a line built under its provisions (Joskow 2019).

While transmission interconnections improve economic efficiencies, they also speed the impacts of electric use on a widened range of people and places. As offices, warehouses and stores turn on their lights around Boston this morning, multiple gas generators turn on across Massachusetts, southern New Hampshire and Rhode Island. There are myriad impacts on local communities, environments, and economies. If better long-distance transmission is built, these effects will expand geographically and multiply.

Ironically, interregional connections also offer a geographic and market opportunity to intrepid--or strategic— transmission entrepreneurs: the potential to profit from a scarce asset in the geography of electric grids. If an interregional transmission line happens to be a direct current (DC) link, which creates a barrier to free electron travel between two AC systems, then the owner can have particular control. Still, the costs to build DC transmission lines are even higher than AC transmission, and multi-level regulatory approvals are uncertain. As a result, would-be entrepreneurs have often sought to ensure that their costs to build interregional lines will be paid. The challenge is to find a way to get construction paid by a collective cost-sharing system while gaining a geographically unique or unusual asset.

To summarize, open-access transmission was essential to developing competition among generators, but for the most part, the unbundled transmission sector itself did not become competitive. Because of their high expense, new transmission investments usually require guaranteed funding paid by retail electric customers. Funding is normally approved by ISO New England in a decision process dominated by existing transmission owners. Transmission construction today is mainly for reliability; few long-distance transmission lines are built. Long-distance transmission development could enable better use of renewable generation, with beneficial impacts on climate and on many local areas with polluting fossil fuel generation. But it also will reshuffle impacts onto myriad other local peoples and places. If funding mechanisms are developed and profits can be assured, new long-distance transmission lines have the potential to provide windfalls for early developers.

c. Distribution & Retail Supply: Continuing Utility Regulation, Competitive Suppliers, Renewable Energy Credits

On the surface, electric utilities appear to have been significantly reduced by restructuring. In most of New England, they had to sell off their generation assets, while their transmission components became separate corporate affiliates. The only part that is still a utility under state regulation is distribution. These distribution utilities could no longer rely on new investments in generation, and concomitant promotion of electrical consumption and local economic development, to provide regular streams of accumulation. In multiple ways and at a series of decision points, electric restructuring posed potential existential threats to electric utilities.

Among these: in the 1990s, utilities faced bankruptcy because of stranded assets, and in the early 2010s they feared a "death spiral" of loss of customers if large, wealthier customers turned increasingly to their own independent renewable generation paired with local storage (Denning 2013; Bronski et al. 2014).

Yet investor-owned utilities successfully sought out new justifications, new allies, and new sources of profit. By the late 1980s, leading Massachusetts utilities were working with nonprofit groups promoting energy conservation and "decoupling," in which utilities could set rates that would allow them to profit, even if electricity sales declined. They worked with low-income advocates, noting that guarantees of universal electrical service could not be assured without state-regulated utilities (NEES and CLF 1989; Raab 1994; Hirsch 1999). A central part of the negotiations over state restructuring in the 1990s was whether utilities' stranded asset costs would be paid; utilities largely won that fight (Borenstein and Bushnell 2000; Kenison 2004; Reishus Consulting 2015). And in their new complex corporate structures (see Section e) their parent companies sought to grow businesses that could win under new competitive markets, while solidifying and expanding the bread-and-butter proceeds of electric distribution utilities and regionally funded transmission affiliates (Northeast Utilities 2006).

In addition to regulating utilities and their rates, New England states also regulate competitive retail electric suppliers to some extent. A bit of background is needed to understand the concept of "competitive retail suppliers." Because investor-owned distribution utilities for the most part no longer generate their own power , when they sell electricity to their customers, they must buy that electricity wholesale and then resell it to retail customers. However, all five New England states that restructured also allowed for retail choice. This allows retail customers to choose a competitive electric supplier. The competitive supplier then becomes the company that purchases wholesale electricity and sells it to retail customers. In New England's restructured states, the distribution utility still delivers the electricity through its local wires and sends the customer's bill, but it is the competitive supplier's electricity prices that are reflected on that bill.

State regulation of retail supply provided a mechanism for restructuring to include mandates for investment in electric conservation and efficiency, and renewable energy. For some of these mandates, the mechanism continued traditional regulatory practices from before restructuring: fees added to utility bills that then paid into a fund (see e.g., Mass DPU n.d.a). However, states also adopted a new neoliberalized approach to renewable energy development, renewable portfolio standards (RPS). In Massachusetts, the first RPS was in the 1997 state restructuring act itself (Massachusetts General Court 1997).

An RPS purports to require that a certain percentage of all generation comes from eligible renewable sources. The way it does this is to require that all investor-owned electric suppliers either purchase a certain number of renewable energy credits (RECs) or pay a fee called an "Alternative Compliance Payment." Generation companies (IPPs and others) that produce eligible renewable energy can sell RECs as well as electricity and earn a second revenue stream. Under electric restructuring, RECs became new commodities in a new regional market (separate from the ISO markets). The regional REC market provides an indirect avenue to help fund generation in renewable energy, by incentivizing additional investment into doubly profitable generation. The Alternative Compliance Payments play an important role as well, as their state-prescribed rate also serves as a price ceiling on market-traded RECs. If electric suppliers cannot acquire enough RECs below this price, Alternative Compliance Payments in effect become a more traditional regulatory approach of a fee mechanism. Alternative Compliance Payments in Massachusetts go to the state Clean Energy Center, which also works to promote renewable energy development (Mass DOER n.d.a)

The REC markets have been continually tweaked so they work effectively and incentivize desired generation technologies. Initially the Massachusetts RPS covered only certain categories of renewable energy built after 1997. Several years later, Massachusetts energy agency staff decided to incentivize old renewable power to stay on line, so they renamed the original RECs REC Class I and added a REC Class II for renewables built 1997 or before. Most Class II RECs in Massachusetts come from old hydropower dams—though large hydropower was not and is not considered "renewable" in Massachusetts policy, unless it is certified as low-impact (Mass DOER 2017). There have been other RECs and REC-like commodities added to the Massachusetts RPS system, including alternative energy credits, solar carve-out RECs, a storage credit called the Clean Peak Standard, and, most recently, Clean Energy Credits (CECs) in 2017 and Clean Existing Energy credits (CES-E) in 2020 (more on "clean energy" in Part III). For standards that incentivize new sources, the percent in the RPS goes up each year – but by how much depends on what is needed to incentivize investment, and that too has been adjusted multiple times (Mass DOER n.d.a, n.d.b). As shown in Figure 4, to meet myriad goals for particular kinds of resource acquisitions, the Massachusetts market-based RPS system has become quite complicated.

	Clean Energy Standard (CES) [1]							Other Mandates (Excluded)**	
	"Clean Generation"			"Clean Existing Generation"					
Year	RPS Class I [2]	Other "Clean Generation"	Total CES	CES-E	RPS Class II [3]	RPS Class II Waste Energy [3]	MA Renewable Energy Requirement *	APS [4]	CPES [5]
2019	14%	4%	18%		2.7%	3.5%	24.2%	4.75%	0.0%
2020	16%	4%	20%		3.2%	3.5%	26.7%	5.00%	1.5%
2021	18%	4%	22%	20%	3.6%	3.5%	49.1%	5.25%	3.0%
2022	20%	4%	24%	20%	3.6%	3.5%	51.1%	5.50%	4.5%

Figure 4. A summary of Massachusetts Renewable Portfolio standards and related standards. Retail electricity sold in 2021 must include at least 49% renewable, clean or other preferred sources. See Part III re. renewable versus "clean." Figure source: Colonial Power Group 2021; reprinted with permission.

In sum, electric utilities are still crucial and powerful players in electricity provision in New England. Also, state regulation of electric distribution utilities and electric suppliers has continued not *despite* neoliberal restructuring, but rather has been a crucial *part* of restructuring. In particular, state regulation has enabled a neoliberalized approach to renewable energy development through the development of renewable energy credits and their markets. Like the ISO markets created through restructuring (see next section) RECs are market-based, but have been repeatedly altered for policy reasons. And, with all their complexity and their success, renewable and other portfolio standards have not yet been enough to come close to eliminating greenhouse gas emissions in Massachusetts's electric sector. As the state builds other steps for reducing greenhouse gas emissions (GHG) emissions in Massachusetts, the state's utilities continue to play lead roles.

d. ISO New England & Regional Wholesale Markets

One of the most heralded and analyzed changes in electric systems since restructuring has been the rise of regional wholesale markets, regionally coordinated transmission grids, and Independent System Operators (ISOs) to manage both. ISO New England is today one of nine ISOs in North America.

ISO New England's role is multi-fold. It runs a variety of markets, including just-in-time electricity (the real-time energy market); a specific financial futures market (the day-ahead energy market); a market for generators that promise to be available to generate three years in the future (the capacity market); markets to pay for quick-response generation (reserves and regulation); and a market for investors to profit from, or hedge against, transmission bottlenecks (financial transmission rights). It manages the fulfilment of bilateral contracts. It has special payments to make sure no company loses money by doing what the ISO directs it to do. To make all these markets and contracts work in real time, and to ensure no transmission line is overloaded, the ISO also directly controls minute-to-minute generation for most New England generators as well as the use of demand resources, while allowing for possible unexpected shutdowns of large resources on the grid. The ISO has rules that limit undue market-power dominance by any one company. The ISO facilitates multi-stakeholder regional grid governance, convening forums for discussing and changing rules. Collaborating with these governance institutions, the ISO regularly makes changes to market design and sometimes adds new markets. Finally, to make all of this work, the ISO collects and publishes a range of data, detailed studies and analyses, and offers trainings to market participants and others (ISO-NE n.d.a, n.d.e; Withers et al. 2021).

Like the other ISOs of North America, ISO New England uses an auction and stacking system to prioritize the use of the least expensive resources. In an auction, companies offer bids of how much, at what price, and in what time frame they want to sell. The ISO stacks offers from least to most expensive. In some markets there is also a demand stack, while in others demand is determined by the ISO, and in the real-time market it is defined by actual usage on the grid. Demand-response resources can also bid into several of the markets. The line where the supply stack meets demand or crosses the demand stack marks the set of resources that will be used during the considered time frame. The marginal bid price for the last resource added onto the stack or subtracted from the stack is the price that all resources are paid (ISO-NE n.d.d).

The central and transformative role of the ISOs is well recognized, and many have described and studied the function and economic effects of specific ISO markets and mechanisms (for more detailed overview of ISOs, see ISO-NE 2013; U.S. FERC 2020; APPA

2021; Cleary and Palmer 2020). Fewer have thought critically about the broader effects of using competitive pricing, or governing electricity via the rules of a competitive market (cf. E. Vogel and S. K. Vogel 2021). These questions are the focuses here. Because prices are abstract and often assumed to be efficient and natural, they are largely out of view of mainstream media, and most environmental and energy activists. Yet the wholesale prices of electricity, capacity, and other commodities act as crucial markers that motivate competitive generation and power purchases; seasonal, daily and minute-to-minute power plant operation; and short- and long-term investment , and thus have profound geographic, economic and material implications.

The intention of price within a competitive market is to treat identical commodities as the same. In the case of electric commodities, price represents the numbers, speeds, volumes, geographic location, potential, etc. of moving electrons. How the costs and benefits are distributed—how electricity is made, what kinds of communities and environments it comes from or travels through, who and what it impacts along the way, how it is used, and who gets to use it—is unseen by these markets. Some of these things get internalized into price, though not evenly. Generation may be more expensive if the local community puts up a fight to stop infrastructure siting, or if there are stronger environmental or labor rules; or it may be less expensive if facility construction is subsidized, or lands are easily acquired. Infrastructure built in communities with less political capital or without legal authority to stop development will be more “cost-efficient” in a competitive market.

Today, day-ahead prices vary hourly, real-time energy prices can change every five minutes, and regulation prices can change within seconds. This is true at over 1000 distinct price node locations across the New England grid. The intent of these changing price signals across time and space is to maximize “social welfare,” defined in terms of total production costs—while keeping the system in balance (Withers et al. 2021; ISO-NE n.d.c). It also has profound impacts on real places and people. For example, changing prices on energy markets can make river flows from hydropower plants increasingly volatile, as these plants open and shut their turbine flow gates according to price signals—with disruptive impacts on river ecologies and on local communities and economies who depend on river flow.

Prices and price volatility also affect corporate behavior. There is both tremendous opportunity for profit and high financial risk. A number of companies that invested in generation, transmission, energy services, and other competitive sectors soon after restructuring in New England and elsewhere have faced major losses and even bankruptcies since restructuring (Joskow 2003; Lucian et al. 2003; Bushnell 2004; Lambert 2006; Gifford et al. 2017). Unable to count on rate-of-return profits, electric companies have sought to reduce their risk and increase their profits by influencing market rules, lowering their state and local taxes, reducing some regulations, adding other regulations and programs, or, sometimes, getting out of the competitive business entirely (Northeast Utilities 2006; Camerato 2018; Anderson 2020; Biewald et al. 2020; Pelzer 2020) (Camerato 2018; Anderson 2020, 2020; Biewald et al. 2020; Jacobs 2020, 2021; Pelzer 2020). It is worth noting that through these strategies, one of the claimed benefits of restructuring—that it puts the risk on shareholders rather than customers—may be undermined by political and corporate behavior.

This relates to another major role that ISO New England plays: making the rules and practices of the electric power markets. There is nothing automatic or natural about what electric power market prices are or how they are determined. They depend on a host of rules and practices rooted in ISO decision making and advised by NEPOOL members (more on NEPOOL members in the next section). Electric restructuring thereby has led to another result: electricity operations and governance have become more opaque and less open to the public. Not only are prices generally considered in the abstract, without illuminating specific local impacts; also, specific data about generator operations, market bids, and profits are protected by ISO rules to preserve competitiveness. The ISO has stricter confidentiality than most federal agencies under the Freedom of Information Act (ISO-NE 2020). Governance in the ISO and NEPOOL is less open than that of a state utility commission (Jacobs 2020). NEPOOL has tried hard to ban the press from its meetings—and if it cannot ban the press, at least ban reporting (Heidorn, Jr. 2019).

To recap, ISO New England and its wholesale markets are among the most dramatic and touted results of electric restructuring. Well beyond the basics of coordinating purchases between electric generators and users, the ISO manages a complex range of markets that have robust participation from a wide variety of companies and financial investors. All these markets depend on sellers' bids and on price signals reflecting the marginal-price resource. These prices change over time and space, which means that these price signals can have profound ramifications for where and when resources are used and the effects of the electric system on people and environments. These markets allow many opportunities for profit and loss, and have led ISO market participants, who dominate ISO governance, to shape these markets in various ways. How these electric markets are governed, and the results, are largely opaque to the public.

e. Deregulation Of Electric Utility Corporate Structure And Finance

A final fundamental change of electric restructuring, too often overlooked, is that the corporate structure and finance of electric utilities was altered along neoliberal lines. These changes were multiplied for newly competitive companies in the deregulated sectors that had formerly been part of vertically integrated utilities. The governance of the grid was also opened to a host of new members from newly complex corporations.

The central legal change was the gradual weakening and ultimate repeal of the federal 1935 Public Utility Holding Company Act (PUHCA 1935), and its replacement with the 2005 Public Utility Holding Company Act (PUHCA 2005). The original PUHCA 1935 had been passed after speculative investments in the electrical sector helped cause the 1929 stock market crash. PUHCA 1935 restricted utility holding companies, that is, corporations that owned electric and gas utilities, to two levels of corporate ownership. Utility holding companies could have a parent corporation—Northeast Utilities, for example—and subsidiary utilities, such as Connecticut Light & Power and Western Mass Electric Company, but no further corporate levels. PUHCA 1935 also required that sibling utilities under the same corporate parent had to be physically interconnected, i.e., geographically contiguous (Funigiello 1973; Hirsch 1999).

PUHCA 1935's geographical restrictions made for strong ties between utilities and local cities and regions. There was often robust local civic investment by utilities, and a sense of mutual dependence among cities, states, utilities and regions, oriented to promoting local and regional economic growth. Holding companies were regionally based, and in New England, many of these banked in Boston (Smith 1949; Landry and Cruikshank 1996; Koistinen 2013).

Some of these geographical implications are shown in Figure 5. The service territories of Northeast Utilities subsidiaries in New Hampshire, western Massachusetts, and Connecticut can be seen to be geographically contiguous. The map shows the 2012 merger, post-PUHCA 1935, with another major utility holding company, NSTAR.

Under PUHCA 1935, electric utility holding companies were also restricted from a variety of speculative and self-dealing investment strategies and had strict limits on their political activities and campaign contributions. To ensure restrictions were followed, utility holding companies' account books were under close review by the Securities and Exchange Commission (Hargis 2003; APPA 2005; Congressional Research Service 2006; Bolton and Rosenthal 2016). The result was unusual stability and predictability. Utilities became the "quintessential widows and orphans stocks," offering stable dividend incomes to a "remarkably dispersed ownership" (Bolton and Rosenthal 2016, 2, 3).

However, by the 1970s, as electric profits became scarcer (for deeper background see Hirsch 1999; Beder 2003), utilities formed a political coalition with manufacturers who hoped for cheaper electricity. In New England and elsewhere they were often supported by environmentalists who hoped to stop the continued construction of ever-larger and more expensive nuclear, coal and oil plants. Together they called for deregulation of the electrical sector and the weakening of PUHCA. Exemptions from PUHCA were created in PURPA in 1978 and in EPAct 1992, and PUHCA 1935 was repealed entirely in EPAct 2005 (Hargis 2003; EEI 2006).

Today, electric companies and their assets may be owned by out-of-state utility giants or by financial companies that see them primarily as financial assets (see e.g., E. Vogel, Urffer, and Donlon 2021). Rather than investing locally, corporate owners may pressure local towns to lower their taxes, and they may locate their headquarters and bank accounts according to other tax advantages (e.g., Marcus 2019; 2020). Federal regulation of electric utility holding companies is now primarily by FERC, and FERC typically considers only whether actions harm over-all competition. The result has been an enormous rise in mergers and acquisitions, corporate complexity, speculative investments within utility corporate families, and expansion into new sectors and geographies. Electricity utilities may increasingly be managed by higher-up corporate owners to provide potential high profits rather than steady reliable profits. Shareholders are now larger and higher-risk investors, no longer conservative widows and orphans (Beder 2003; Bolton and Rosenthal 2016). At the same time, these conglomerates retain utilities at their core, providing an element of financial security and loan collateral not enjoyed by other non-utility-owning corporations—potentially enabling pyramid investment schemes as they did in the roaring 1920s, (Funigiello 1973; Thakar 2008; Prechel and Istvan 2016; Hempling 2018).

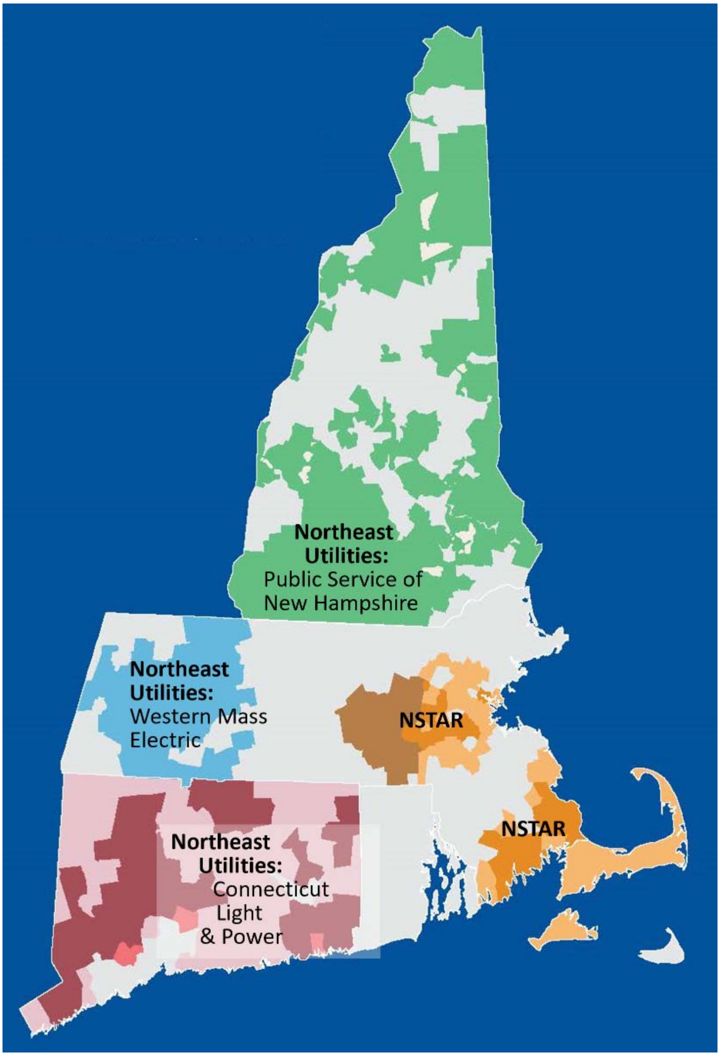

Figure 5. Map of Northeast Utilities and NSTAR merger in 2012, creating the company that would later be renamed Eversource. Prior to the repeal of PUHCA 1935, Northeast Utilities had included the geographically contiguous Western Mass Electric, Connecticut Light & Power and Yankee Gas, and Public Service of New Hampshire. The addition of the non-contiguous NSTAR could only happen after the repeal of PUHCA 1935. Source: Northeast Utilities 2013. Reprinted with permission.

Once approved, today's utility-containing conglomerates are far less transparent and far harder to regulate than in the days of PUHCA 1935—especially since neoliberal policies have reduced agency funding, narrowed regulatory criteria, and devolved many responsibilities to smaller-scale and lower-level jurisdictions. There is also significantly less public input and accountability (Thakar 2008; Prechel and Istvan 2016; Hempling 2018). Corporations that own utilities may use their increased political sway in state, national and even international policy to undermine climate mitigation and other public-purpose mandates, or reshape them around profitable mechanisms (e.g., Russell and Kurniawan 2019; Biewald et al. 2020; Stokes 2020; Hall, Culhane, and Roberts 2021).

While electric corporations were transforming, there was also a related change in New England Power Pool (NEPOOL) membership. NEPOOL's 1996 proposal for a "complete restructuring of the wholesale electricity business in New England," that led to the creation of ISO New England also involved "opening up NEPOOL membership to all market players" (NEPOOL 1997). In 1995, NEPOOL's 91 members were all utilities, most of them small municipally owned utilities. Within 3 years, membership numbers had more than doubled. New members included IPPs, aggregators and marketers eager to participate in competitive markets (NEPOOL 1996; 1999; NEPOOL and ISO-NE 1998; ISO-NE 2000). Today's 514 members are now divided into 6 equally weighted voting sectors: generation (11 members), transmission (5 members), suppliers (130 members), alternative resources (20 members), publicly owned (59 members), and end users (38 members) (NEPOOL 2020; n.d.). Many of these participants are subsidiaries of large corporate families, some of them utility holding companies. By dominating small-membership voting sectors like generation or transmission, or by having membership for multiple subsidiaries that fit into different voting sectors, large corporate families have the opportunity to dominate NEPOOL voting. Meanwhile, state attorney general offices, environmental and consumer nonprofits, and others, share the one-sixth vote in the End User Sector. Only recently have the rules of markets and voting become publicly contested or even analyzed (Ropeik 2018; Yoo and Blumsack 2018; Jacobs 2020; Office of Attorney General Maura Healey 2020; Pazniokas 2020; ISO-NE n.d.b).

To summarize: the change in corporate structure and governance of electric companies has been a major and under-recognized transformation of electric restructuring. The weakening of PUHCA 1935 and its final repeal in 2005 opened the door for wide-ranging mergers and acquisitions and greater complexity of electric utility-owning corporate families. Today, the flows of money and decision-making in the corporations that own electric utilities and other electric companies are poorly regulated and opaque to the public. The loss of PUHCA 1935 also cracked open the long allegiance between electric companies and their geographic service areas, reducing many electric companies' interest in local and regional investments. It changed investors and investment incentives from conservative and stable widows and orphans to more speculative and riskier actors and interests. In ISO New England (and many other ISOs as well), this problem is made worse because the stakeholders who participate in ISO governance are largely market participants who profit off the market, with limited public-interest involvement, and meetings are closed to the public.

III. Implications for Massachusetts Imports of Hydro-Québec Power:

The previous Part described several significant institutional, political-economic, and geographical changes associated with electric restructuring. This Part shows some ways these changes have shaped Massachusetts's recent drive to import Hydro-Quebéc power. This applied example helps reveal key legacies, and limits, of electric restructuring.

The desire for Massachusetts to import Hydro-Quebéc power did not arise primarily from electric restructuring. New Englanders have long looked toward their northern neighbor Quebéc as a possible source for extra electricity because its electricity was cheap and ample, whereas New England has for much of the last century had some of the most expensive electricity in the United States (New England Council Power Survey Committee 1948; Haggstrom 2017). In the 1980s, well before most aspects of electric restructuring had unfolded, three direct current (DC) transmission interconnections were built to connect Hydro-Quebéc's and New England's grids, one running all the way to Massachusetts (NESCOE 2013; see also Stroup, Kujawa, and Ayres 2015). The recent policy driver for Massachusetts to import a new block of Hydro-Quebéc power is the state's 2010 mandate to reduce GHG emissions (Silverstein and Autery, this issue).

Ironically, on the other side of the international border—where electricity is generated, transmitted and sold by a giant government-owned corporation—the legacies of electric restructuring are a significant driver for hydropower exports. If low-cost Hydro-Québec power can reach southern New England, it has the potential to underbid other electric generators, potentially becoming a dominant part of the New England electric market. There are considerable opportunities for profit in the energy, capacity, and reserves markets, and in bilateral sales agreements, for a giant hydropower producer. Hydro-Québec restructured itself back in the 1990s in order to sell to the new wholesale electric markets in the United States (Froschauer 1999; Hydro-Québec 2001). Since its restructuring, a priority for Hydro-Quebéc has been to "improve its profit margin and provide a greater return to its shareholder," the Province of Quebéc (Hydro-Québec 1997, 9). One of the ways to increase profit is to export more power. To further this effort, Hydro-Quebéc has been constructing over the last ten years yet another major hydropower development, a four-dam project on the Romaine River to be completed in 2022 (Hydro-Québec n.d.; see also Desmeules and Guimond, this issue, E. Vogel and McCourt, this issue), so it has plenty of electricity to spare.

But electricity cannot get from Quebéc to Massachusetts except through the physical interconnection of a transmission line, and the current lines do not allow Massachusetts and the rest of southern New England to make full use of the electricity Hydro-Quebéc has to offer. Hydro-Quebéc and its owner, the Province of Quebéc, can relatively directly and independently approve, fund, and build remote dams and long-distance transmission lines on the Canadian side of the border (e.g., Hydro-Québec 2021). The transmission bottleneck is on the United States side: there is insufficient transmission from northern New England to the population and economic centers of Boston and the rest of southern New England. In New England, transmission construction is undertaken by investor-owned companies who must earn a profit while working with multiple states and ISO New England. The key question for Massachusetts policymakers has been how such a line could get funded.

How Restructuring Shaped Massachusetts's Policy Approaches To Fund A Transmission Line

Before restructuring, an ambitious vertically integrated utility might plan a transmission line, get approval from FERC, build the line, add the investment to its cost basis with its state utility commission, and the utility commission would likely allow retail rates to pay for it. After restructuring, this financing arrangement is generally no longer possible.

In the generation sector, competition has facilitated the construction of new infrastructure. Competitive companies build generation and recoup costs (or not) by selling on the wholesale markets. But as explained previously, transmission is rarely built without guarantees of cost recovery. A line from Hydro-Quebéc to southern New England is not needed for electrical reliability, so the usual ISO cost-sharing mechanisms do not apply. And, as described earlier, the other means to fund transmission lines through the ISO have rarely if ever been used.

The other post-restructuring mechanisms that help fund some electric infrastructure could not in the early- to mid-2010s provide extra funds to incentivize the line. The RPS was lower than the GHG reduction targets, and Hydro-Quebéc power does not count as renewable under Massachusetts's RPS anyway, as its dams are recognized as having high environmental impact, as well as impacts on First Nations people. Nor could the ISO's capacity market provide the additional revenue, since the ability to provide power to the New England market could not be guaranteed three years in advance until all permits and funding were secured.

Thus, Massachusetts policymakers, stakeholders, interest groups and lobbyists had to look for a different mechanism to incentivize and fund the construction of a high-voltage transmission line from the Hydro-Québec grid to the state. Twenty-odd years after electric restructuring, revenues would still need to be guaranteed by government mandate or regulation, and one way or another, that meant electric customers would be required to pay the cost to protect investors and shareholders from undue risk.

The central steps used by the state of Massachusetts to incentivize and fund the construction of a long-distance high-voltage transmission line to import a large new block of Hydro-Quebéc power were (1) the 2016 Massachusetts Energy Diversity Act, (2) a follow-up Request for Proposals, and (3) the selection of a winning proposal. These were also supported by 4) the addition of clean energy credits to the state renewable portfolio standard.

Step one was the 2016 Energy Diversity Act (Massachusetts General Court 2016). It required Massachusetts's three investor-owned utilities to contract for long-term purchase of 1200 MW of "clean energy generation," defined specifically as *either* new Class I REC eligible resources *or* hydroelectric generation, or a combination of the two. This legislation emerged out of a compromise among interest groups partially shaped by electric restructuring. The two Massachusetts governors of the 2010s (one Democrat, one Republican) and many business leaders had advocated, like many of their predecessors, for larger volumes of Canadian power as a route to low-cost supply. Environmental advocates, deeply ambivalent about large hydropower as a solution to climate change, pushed for more emphasis on wind (see Silverstein and Autery, this issue). So did political representatives from southeastern Massachusetts, who hoped for wind-based economic development in their part of the state. Hydro-Quebéc's U.S. arm, HQUS, was unsurprisingly an active supporter of hydropower imports (e.g., Young 2016). In contrast, the New England Power Generators Association (NEPGA), the organization of New England IPPs, opposed hydropower imports. What Hydro-Quebéc had to gain in market share by reaching southern New England markets, existing New England IPPs had to lose. NEPGA's rhetoric, however, was more principled: it defended the competitive market and opposed the entry of "non-competitive," or subsidized, electric generation (NEPGA 2013; Dolan 2015). NEPGA also got a well-respected former utility commissioner to advocate for competition on their behalf (Tierney 2015). The irony is that NEPGA's enthusiasm for the competitive market was also a defense of the competition-limiting physical constraints of existing infrastructure. In the end, the statute was a compromise, requiring "clean" power rather than hydropower, limiting the requirement to 1200 MW, and pairing that with a parallel requirement to acquire 1200 MW of off-shore wind.

Requiring distribution utilities to acquire generation in a way that would pay for a transmission line went against a key tenet of restructuring, the importance of unbundling generation, transmission and distribution. Unfortunately, Massachusetts had no direct regulatory power over transmission tariffs with which to fund a line. The state *did* have the authority to regulate distribution utilities, though, so this was a regulatory approach that could work. The chosen funding mechanism also strengthened and provided profit to Massachusetts's state-regulated utilities, still a politically and economically powerful group. It might not appear beneficial to utilities that they were mandated to purchase 1200 MW of power. However, they were allowed to include those costs in their rate applications to the state Department of Public Utilities, which meant putting them onto their customers' bills. This arrangement is like the old rate-of-return mechanism in which development of large-scale generation was a primary route to increased utility profits. The 2016 Act also allowed up to 2.75 percent remuneration for the utilities beyond their costs, a rate later approved by the Massachusetts Department of Public Utilities (Mass DPU 2019). Thus, acquiring Hydro-Quebéc power was another in a long line of policy solutions that used state regulation of investor-owned electric utilities to achieve a policy goal, while guaranteeing profits to utility shareholders.

Step two of Massachusetts's approach to incentivize and fund Hydro-Quebéc imports was the issuance in early 2017 of a competitive Request for Proposals (RFP). This was a way to bring in competition, even with a required power contract, guaranteed cost recovery, and guaranteed utility profits. Following advocates of competition (e.g., Joskow 2019), the RFP was shaped around performance standards and incentives. The winning proposal would be lower-cost, relatively easy to permit, and buildable in a short timeframe (Mass DPU 2019).

Step three was the development of a selection committee and the selection of a winning proposal. The selection committee consisted of representatives from the Massachusetts's three remaining investor-owned distribution utilities, with staff from the state Department of Energy Resources as advisors (Mass DOER 2017; Mass DPU 2019). The utilities' decision-making power in the committee was important, or at least legitimized, because the utilities would be the ones purchasing the contracted power. It is impossible to evaluate their role fully, however, because even though the committee consisted of representatives of state-regulated utilities and a state agency, and the decision steps were laid out and explained, the committee meetings were not public.

From 53 proposals, the selection committee initially chose Northern Pass as the top selection, with the New England Clean Energy Connect (NECEC) a close second. Both would build a new high-voltage transmission line to bring Hydro-Quebéc power to southern New England, one through New Hampshire and the other through Maine (Massachusetts Clean Energy 2017).

Building a major new transmission line under this RFP was a desirable opportunity for whoever won the competition, for multiple reasons that had only a little to do with electric restructuring. As explained above, construction costs would be paid by electric customers. For any electricity transmitted above the contracted quantity, and for years to follow, the transmission line owner would earn money as a transmission provider. Moreover, both winning proposals were direct current (DC) lines. DC lines are more efficient at high voltages and long distances. But DC lines also have the advantage that they do not allow electrons to flow freely to and from the AC grid. Thus the future owner would be able to control electricity flow. There is only one other high-volume existing interregional connection between Quebéc and southern New England. Thus, a company that builds a new high-voltage DC line has the potential for extra profits based on controllable geographic scarcity.

One aspect of restructuring that was prominent in the decision-making among proposals was the corporate complexity and hydra-like influence of utility-owning companies and other electric corporations. The number one pick of the selection committee, the Northern Pass line, was co-owned by Hydro-Quebéc and Eversource Energy Transmission Ventures, Inc. The latter firm was part of the same corporate conglomerate, Eversource Energy, as Massachusetts's largest utility, NSTAR, which calls itself Eversource, and New Hampshire's largest utility, Public Service Company of New Hampshire (PSNH), also called Eversource (Eversource n.d.). Thanks to its earlier acquisition of PSNH, corporate Eversource owned much of the right-of-way in New Hampshire on which the transmission line would be built (see Nolan and Rinaldi, this issue; Kroot, this issue). (See also Figure 5.) Northern Pass had been under development for some years so could claim it was ahead in key criteria for the selection committee: it was well on its way in getting permits and could be built in a short timeframe. Still, it is hard not to suppose that Northern Pass rose to the top in part because Eversource the Massachusetts utility was a dominant member of the selection committee itself. Corporate Eversource's many affiliates likely also had collaborated to ensure that other options were not available before the competition. They were likely active in ISO transmission governance and in NEPOOL, voting against other transmission options, like having ISO tariffs pay for a long-distance line to bring Maine wind to Boston. While this is unknown because those meetings are not public, it is known, thanks to Massachusetts's open lobbying records, that Eversource had lobbied in the Massachusetts legislature to kill programs that would have promoted other kinds of renewable energy (Hall, Culhane, and Roberts 2021).

Despite Eversource's many years organizing and strategizing and millions of dollars spent on Northern Pass, the line was rejected by New Hampshire (see Kroot, this issue; Nolan and Rinaldi, this issue). Maine's NECEC then moved forward, though at the time of this writing it is still facing court and state referendum challenges (McCourt, this issue; Frederic, this issue). Though not co-owned by a Massachusetts utility, NECEC also reflects corporate restructuring of utility holding companies. It is co-owned by Maine's largest utility, Central Maine Power (in Maine) and Hydro-Quebéc (in Quebéc). Central Maine Power is now a subsidiary of national energy giant Avangrid, and the international and even-more-giant Iberdrola.

Part of the rationale behind competition is that it reduces costs. The competitive approach adopted by Massachusetts's RFP meant that successful competitors had to lower their monetary costs. However, this also meant externalizing costs onto other people and places, and into the future. The winning companies' proposals did not offer to bury their transmission lines for much of their route, as this is expensive, even though that would have provided for less impact to rural scenery, a crucial economic resource in northern New England, and part of local and state identity. Among the losing proposals was yet another long-distance DC transmission line co-owned by Hydro-Quebéc, the New England Clean Power Link, routed through northern New England's third state, Vermont. Significantly, New England Clean Power Link had been fully permitted and was therefore even closer to ready to build than Northern Pass. New England Clean Power Link had faced little opposition in Vermont because it was to be fully buried, either underwater through Lake Champlain, or underground (TDI New England and Hydro-Québec 2017). However, this had also raised the costs, and it is likely based on the selection criterion of low cost that the selection committee favored Northern Pass.

But minimizing the amount of line that would be buried ended up meaning a lot more political opposition, escalating costs, and implementation delay, which were not included in the bids. Even after the Maine-based NECEC was selected, it has added costs to its projects to accommodate opponents within Maine, including more miles of buried lines and extensive mitigation and economic development funds (see Frederic, this issue; McCourt, this issue).

Farther away and even more external to the Massachusetts decision were the costs of settlement agreements with First Nations and environmental mitigation associated with large-scale hydropower development in Quebéc. These costs were part of the decision process in Massachusetts only insofar as they were embedded in the price to purchase Hydro-Quebéc power. Any impacts that were not included in those settlements or mitigation were entirely external to the costs informing Massachusetts decision-making.

Step four of Massachusetts's approach to incentivize and fund the construction of a long-distance high-voltage transmission line to import a large new block of Hydro-Quebéc power was the addition of clean energy credits to the state's renewable portfolio standards.

As explained above, Hydro-Quebéc power does not qualify as renewable in the Massachusetts RPS. However, the 2016 Energy Diversity Act defined new hydropower as "clean." The next year, 2017, a few months after the RFP for clean energy was issued, state regulators generalized this concept by creating Clean Energy Credits (CECs), a new RPS category that can include both hydropower and nuclear power (Mass DEP 2020). Thus, the transmission line to southern New England that is funded through the 2017 clean energy RFP will earn for its owners not only a 20-year contract with guaranteed revenues, but also additional revenues from selling a newly created commodity, CECs. Both the contract and the CECs will be paid for by Massachusetts retail electric customers (the RFP through the distribution utilities and the CECs through retail electricity providers, both incorporated in the same utility bill).

To encapsulate this complex policy story: collective funding via the ISO was unavailable to pay for a long-distance transmission line, and it was too risky a venture for capitalist firms without guaranteed funding. So, Massachusetts had to devise a different policy mechanism to get a transmission line built to bring Hydro-Quebéc to southern New England. A utility-paid long-term power purchase agreement made use of the state's continuing regulatory authority over distribution utilities, while also offering guaranteed profit to those same utilities, who remain economically and politically powerful long after electric restructuring. Policymakers inserted competition in the form of a competitive RFP, though the selection committee was made up of representatives of Massachusetts's three surviving investor-owned distribution utilities and meetings were not open to the public. The two winning projects were co-owned by corporate siblings of large utilities—the first choice, Northern Pass, by a sibling of Massachusetts's largest utility, and the second by Maine's largest utility. The utility corporate families had already helped defeat other options to lower GHG emissions. The performance standards of the selection favored projects that reduced costs; however, political opposition forced both proposals' owners to promise to bury key portions of the line, an added expense, and New Hampshire still rejected the number 1 pick, and the number 2 pick is contested in Maine, adding still more expense and years of delay. After the RFP selection, Massachusetts added "clean" energy credits to the state's RPS, allowing Hydro-Quebéc power sold over the new line to earn a second incentivizing revenue stream without having to meet the standards of low-impact hydropower that would be required for "renewable" energy.

Geographical Implications: The Wide Social And Environmental Justice Ramifications Of Bringing Hydro-Quebéc Power To Massachusetts

Massachusetts's acquisition of a large new block of Hydro-Quebéc power to Massachusetts via a new high-voltage transmission line has profound geographical implications. The implications center not only around the impacts of the line itself but also the ramifications of physically interconnecting remote extraction locations with centers of consumption.

It is likely though not guaranteed that importing a large new block of Hydro-Quebéc power will not only help Massachusetts meet its GHG reduction goals but will in fact result in a net reduction of GHG emissions (Rogers 2016; Dimanchev, Hodge, and Parsons 2020; Mass EEA 2020; Silverstein and Autery, this issue).

But there are many other consequences. In Québec, scores of major dams and many rivers—almost all in First Nations territory—may be affected by both regular and intermittent changes in southern New England electric demand. Hydro-Quebéc power will come through a DC connection so responses to price changes cannot be instantaneous. However, Hydro-Quebéc can certainly respond to, and profit from, seasonal and daily changes in electric prices, and can likely respond to real-time price changes within minutes. This means New England ISO market optimization is likely to incentivize greater river flow volatility in remote Quebéc.

If enough electricity flows south at profitable rates, Hydro-Québec may build still more large dams on other pristine rivers in First Nations territory, expanding the number of geographic locations affected by southern New England electric demand (Hydro-Québec 2019; Storrow 2019).

In Québec, more hydropower means more construction, mining, and wage labor, with all the attendant benefits, costs and complications of capitalist economic development and politics in remote indigenous lands. The social impact may be determined in part by profit-sharing, compensation and mitigation agreements with First Nations bands, as well as labor and land practices (Desbiens 2013; Guimond and Desmeules 2018; Desmeules and Guimond, this issue). These impacts are not part of Massachusetts policy decision making process.

Meanwhile, on the southern end of the line, electric prices may go down, which may facilitate electrification of other sectors, may change manufacturing, cause the closure of current IPP generators or other fossil fuel infrastructure, and impact local economies in diverse ways (Conaway 2006; Tierney 2015; Howe 2016; Dimanchev, Hodge, and Parsons 2020).

Absent regulations or settlement agreements, profits from the future transmission line are much less likely than historically to accrue to Maine, or even to Boston, where financing for Maine corporations was often located. Instead, they will be shared among the national and international shareholders of Avangrid and Iberdrola.

IV. Legacies And Lessons Of Electric Restructuring For Massachusetts's Effort To Reduce GHG Emissions By Importing A Large New Block Of Hydro-Quebéc Power

In this concluding Part, I draw some overarching themes and lessons from my analysis of New England electric restructuring and its influence on Massachusetts's approach to securing hydropower imports from Hydro-Quebéc as a means to reduce the state's greenhouse gas emissions.

The first lesson is that the institutions, interests, and processes shaped by electric restructuring underlie the ways we in Massachusetts and New England manage electricity, how we strive to mitigate climate mitigation, and how we undertake electricity infrastructure projects like a transmission line to bring Hydro-Quebéc power to Massachusetts. Electric restructuring here has not primarily entailed privatization as it often has in other global regions (see e.g., Guy, Graham, and Marvin 1999; Kellow 1996); most electric companies were already investor-owned before restructuring, and most publicly and cooperatively owned utilities remained publicly and cooperatively owned. Rather the overarching theme has been the infusion of markets and competition into seemingly every electric policy strategy. Though markets and competition are designed as resource-neutral and place-neutral abstractions, they have had profound material and geographical consequences--from proliferating gas plants in southern New England to a lack of transmission investments in northern New England to the incorporation of a growing range of places and resources into fluctuating operations responding to five-minute price signals.

At least as important has been the profound change in the institutions that run our electric system. This includes the creation of ISO New England and the transformation of NEPOOL membership; the disappearance of oversight from the Securities and Exchange Commission and the rise of FERC, with its regulatory focus on competition as core public good; and the reemergence after more than three quarters of a century of giant, complex, and ever-more-powerful electric corporate families. Restructuring has also created entirely new kinds of political players and alliances, such as southern New England generators who may resist new entrants into the ISO-New England market; and it has altered old ones such as the sometimes-uneasy alliance among utilities, their transmission affiliates, state policymakers, large electric users, and environmental groups.

A second key point that becomes evident is that electric restructuring is not a single thing. Like neoliberalism more broadly, it is a multiple and constantly changing set of policies, practices, assumptions, attitudes and institutions. Nor is it somehow "pure"--purely private-sector, competitive, or market-based. Electric restructuring has incorporated deliberate regulation and mandates and has required repeated market tweaks and creation of new commodities and markets to meet public policy goals. In some cases, as in transmission planning and cost and revenue allocation, electric restructuring has meant more collectivization of operations and decision making, not less. There is still ample rate-of-return funding with costs of development put on electric customers, just as in the old days of regulation, and plenty of guaranteed profits. In many cases these cost burdens and profit guarantees are essential to make the markets and competition work. All these and a variety of mandates and fees are often blended with competition, as in the long-term contract for Hydro-Quebéc power that may be delivered by the NECEC line. In short, the markets and competition that have resulted from electric restructuring have and will continue to have many varying, changing, incomplete and hybridized parts.

Third, while electric restructuring has clearly been an opportunity for new strategies of accumulation (Harrison 2020), in Massachusetts and New England at least it also has genuinely advanced or complemented a number of environmental and social public policy goals (cf. Castree 2011; Mansfield 2009). This included a rapid fuel switch to natural gas which helped dramatically reduce the state's carbon emissions. Through Massachusetts state mandates and fees, the restructured electric system also continues to support energy efficiency and electric service for low-income residents. The ever-expanding and diversifying state renewable portfolio standard has helped promote a range of new kinds of generation. State mandates for long-term power contracts, structured within competitive systems of performance standards and bids, may yet produce new off-shore wind and high-voltage transmission lines to import Canadian hydropower. Massachusetts and New England have also created new markets and regulations to protect and promote goals outside of cost reduction--electric reliability, for example, and future investments in capacity. None of these public purpose outcomes are inherent to the markets or competitive systems. They have required human beings inside and outside of policymaking and policy-implementing institutions who have paid attention to how the markets and systems they created actually work for companies, customers, and resources, and who have regularly worked or fought to change them (cf. Berk, Galvan, and Hattam 2013; S. K. Vogel 2018).

Fourth, at almost every step, it seems, companies have tried to find a way to avoid too much competition because of the very real financial risks entailed. One of the surprises is how much this is still done with rate-of-return funding, even though ending this cost-based system was a major rationale for restructuring. Rate-of-return funding is particularly dominant for transmission investments. This includes the long-term contract for Hydro-Quebéc power, although its mechanism is distinct from the usual reliability-driven transmission funding through the ISO. Another limit to competition has been the geography of transmission lines. Much of what has motivated the political fights in Massachusetts over wind versus gas pipelines versus Canadian hydropower has to do with protecting now-incumbent gas generators from new competition that might come in via new transmission lines (or helping those incumbents with new gas pipelines). A crucial corollary to the ubiquitous effort to contain competition is that electric restructuring has not entirely kept the risks and the costs on shareholders rather than electric customers. Rather, intolerant shareholders burned by early competitive disasters have found ways to use public policy to reduce their risk.

Fifth, the institutions and systems that grew out of restructuring rely above all on price as the key decision criterion. However, as geographers have long noted, price is neither neutral nor objective. The price of a generation plant or transmission line depends, for example, on the level and sophistication of local opposition, and the decision-making structure of the jurisdictions in question. What price does, however, is help to separate the impacts and politics in these sites from the vision of those who craft broader policy and markets. Once infrastructure is built, prices in regional electric markets enroll distant and remote landscapes and people into rapid response to demand from bigger cities like Boston.

Finally, all this has profound geographic implications—and, as a corollary, for wider concerns of environmental and social justice through the transition to low-carbon electricity. Anyone who cares about rivers, landscapes, communities, climate, environmental justice, etc. may find their resources of concern affected by legacies of electric restructuring. There are risks in pairing urgent policy to mitigate climate change with the now-common mechanisms and abstractions of electric markets and competition, especially in concert with increasingly complex, consolidated and obscured corporate power (cf. McCarthy 2015). The legacies of electric restructuring include not only markets, prices, and competition, but also restructured corporations and new interest-group coalitions. These have led to collusive decision-making, constraints on infrastructure geographies, and continued guaranteed profits for major economic interests at retail customers' costs, as part and parcel of Massachusetts's and New England's current energy transition.

Electric markets, competition, grids, and the institutions associated with them are human creations and can be influenced and reshaped, but not if they are taken for granted. Geographers and other critical scholars have important roles to play in making visible and comprehensible the institutions and geographies we have inherited from electric restructuring, and in illuminating their wide ramifications. Making these linkages legible is particularly important if we want to work toward wider social and environmental justice as we advance a new electric transition toward low-carbon-emitting power. This article has been an attempt to lay some of the groundwork to help make this possible.

Eve Vogel is Associate Professor and Co-Program Head of Geography at the University of Massachusetts, Amherst. Email: evev@umass.edu. She studies the politics, policy, and socio-environmental history of rivers and electric systems.

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Endnotes

[1] Much of electric restructuring did not apply to publicly owned utilities. In New England states, as in most others that restructured, publicly owned utilities were not required to unbundle, and many are still vertically integrated. Massachusetts has about 40 municipally owned electric utilities.

[2] Some investor-owned electric utilities own some generation facilities. In Massachusetts, for example, there are provisions for them to own solar power generation facilities (Mass DPU n.d.b). New Hampshire's largest utility, Public Service Co. of New Hampshire (PSNH), challenged many restructuring provisions and delayed unbundling for many years (Kenison 2004).

[3] If low-cost Canadian hydropower increases its market share in New England, customers' electric prices will not necessarily go down. That will only happen if and when Canadian hydropower becomes the marginal resource on the New England grid.

[4] This mechanism of rate-of-return acquisition of new generation has been used for other resources beyond Canadian hydropower, in Massachusetts as well as in other states (see e.g., NESCOE 2013). This includes the parallel RFP for wind energy in the 2016 Energy Diversity Act (Massachusetts General Court 2016).

[5] Prechel and Istvan (2016) point out that this kind of naming may make citizens who know and trust their local utility assume the trustworthiness of its often higher-risk sister (although Frederic, this issue, suggests the opposite has happened for the NECEC line through Maine, which is owned by the not-well-trusted Central Maine Power).

[6] The Clean Energy Standard includes RPS-eligible generators, but it also includes those that: "[d] emonstrate net lifecycle GHG emissions of at least 50% below those from the most efficient natural gas generator (e.g., hydro, nuclear, etc.)" and are "located in the ISO-NE control area, or… in an adjacent control area and utilize new transmission capacity" and "commenced commercial operation after 31 December 2010." In case there was any doubt from that three-part description, the regulation specifies that energy procured pursuant to the 2016 Energy Diversity Act counts for CECs (Mass DEP 2020; Mass EEA and Mass DEP 2017).

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