7 Networks of Power: Toronto’s Waterfront Energy Systems from 1840 to 1970

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Urban networks in the contemporary city are largely hidden, opaque, invisible, disappearing underground, locked into pipes, cables, conduits, tubes, passages and electronic waves. It is exactly this hidden form that renders the tense relationship between nature and the city blurred, that contributes to severing the process of social transformation of nature from the process of urbanization. Perhaps more importantly, the hidden flows and their technological framing render occult the social relations and power mechanisms that are scripted in and enacted through these flows.

Kaika and Swyngedouw 2000: 121

Modernity, Urban Infrastructure, and Socionatural Networks

In the nineteenth and twentieth centuries, complex networks of extraction, transformation, and circulation provided the growing city of Toronto with crucial material inputs – including water, energy, and building materials – required for urban and industrial expansion. These networked linkages were more, however, than mere provisioning systems. Rather, they also ‘hybridized’ nature and the city in the urban landscape and in the urban consciousness. The 1911 lighting of Toronto’s city hall with hydroelectric power generated over 150 kilometres away at Niagara Falls serves as a prime example (e.g., Careless 1984). This moment not only consolidated connections between the growing city and its hinterland, but also galvanized the dream image of a modern city forged from the fusion of nature and the urban.

Erik Swyngedouw (1996), in attempting to theorize a political ecology of urbanization, coined the term ‘cyborg urbanization’ to refer to
the distinct ways in which the growth and development of cities draws on metabolic relations between ostensibly distinct social and natural processes, fusing them in networked relations of production, circulation, and use with definite implications for the spatial form and political experience of the cityscape. In similar fashion, Matthew Gandy develops a perspective on socio-technological networks involved in the extraction, processing, distribution, and delivery of water and other forms of nature as processes foundational to the modern city (primarily in reference to Paris and New York – see 2005, 2002, 1999). For Gandy these processes have constituted urban modernity via the production of distinctly modern forms of urban spatial networks (e.g., water, sewage, and energy systems) that have not only produced and sustained the social and physical spaces of cities, but have also given them meaning in the fusion of nature and the urban.  

And yet, these networked provisioning systems tended to elicit profound ambivalence. Drawing from Gandy’s work on New York (2002), nineteenth-century development of the city’s water-supply infrastructure – most notably in the form of the Croton Aqueduct – was certainly propelled and proudly signified by a distinctly Promethean impulse whose hallmarks were the conquest and rationalization of nature and space. And yet, while some features of the system boldly proclaimed a muscular modernity, great efforts were devoted elsewhere to obscuring it from view, particularly those facets deemed ugly, distasteful, or otherwise undesirable (e.g., sanitary sewers and the like). In this manner, for Gandy, nineteenth-century New York water infrastructure both celebrated a new urban synthesis of nature and culture and yet paradoxically retrenched cleavages between the city and its hinterland. Kaika (2005) makes similar observations with regard to modern water infrastructure in Athens, Greece, noting that the movement of water through space via highly invisible networks from hinterland to tap helped domestic water take on simultaneously a mundane and yet mystical character. For Toronto, direct parallels may be drawn in considering the juxtaposition of the celebrated art deco Harris filtration plant in the city’s east waterfront area with the otherwise largely hidden network of connections linking taps and tubs with water intake deep beneath the surface of Lake Ontario.  

Efforts to actively disclose and obscure the socio-technical networks at the heart of cyborg urbanization help to give specific material shape and cultural meaning to the particular spatial arrangements or ‘spatial fixes’ (Jessop 2006; Schoenberger 2004; Harvey 1989b, 1982) that enable
commodities – including raw and refined material inputs – to circulate through urban spaces. In this chapter, our goal is to examine the role of energy networks and infrastructure in the emergence of Toronto as a leading (and eventually the leading) Canadian city and, in particular, to focus on Toronto’s waterfront in this respect. We examine the city’s central waterfront as a space shaped by networked relations of energy provisioning which acted as a fix of sorts for the movement of energy commodities through space, not least via the establishment of energy infrastructures for storage, conversion, and movement. Our focus on the production of Toronto’s waterfront spaces as they were implicated in the urban metabolism of energy provisioning is inspired by scholarship examining the role of metabolic relations between town and country in the historical geography of capitalist urbanization in general terms (e.g., Gandy 2005, 2002, 1999; Kaika 2005; Kaika and Swyngedouw 2000; Cronon 1991), but also by a desire to elucidate in particular the dynamics and implications of emerging, modern, and largely fossil-hydrocarbon fuel systems.

A focus on energy systems is clearly pertinent to the environmental history and political ecology of cities, not least because of the central role played by high-quality and relatively cheap (largely fossil) fuels in the historical geography of capitalist modernity (Clark and York 2005; Altvater 1993). For some time now, expert and lay speculation has centred on whether or not the age of oil – and to some extent that of fossil fuels more generally – has passed its apogee. And while approximately 80 per cent of the world’s primary energy still comes from fossil fuels, the age of cheap available energy may well be past (Holdren 1992). If so, among the myriad implications is a need to understand energy systems as constitutive elements of experienced and inherited historical geographies, urban and otherwise. In short, what is required is attention to the particular hows and whys of energy systems and their social and environmental geographies (Huber 2009a, 2009b; Zalik 2008; S. Watts 2006; M. Watts 2003), including in an urban context.

In looking at the nexus of energy systems and Toronto’s urban waterfront over the period from about 1840 to 1970, we draw inspiration in particular from the work of Debeir et al. (1991). In their largely overlooked book In the Servitude of Power, Debeir et al. call for a broad historical political economy and ecology of energy systems and energy transitions in order to understand the role of energy supply and energy conversion in capitalist modernity. This includes focus on the ways in which social and thermodynamic notions of power give shape to energy
systems. Eschewing a crude materialist or economic determinism, we nevertheless insist that the material properties (and what might in retrospect be called the ‘materialities’ more generally) of energy sources and energy conversion be factored into analyses of how and why energy systems (including primary fuels, conversion and distribution technologies, end-use social demands, as well as controls and constraints on energy provisioning) arise, and how and why transitions from one energy system to another take place. We adopt some of the conceptualization and terminology deployed by Debeir et al., including their emphasis on interconnected, networked elements of energy systems (not merely primary fuels) and the various energy converters and energy carriers linking upstream appropriation of fuels to end uses via complex chains of physical and social connection and transformation.

Explicit conceptualization of the geography of energy systems is for the most part absent in Debeir et al., and yet a geography of energy systems is clearly implicit. This is not least because a focus on energy systems clearly points to cities. Growing cities typically need increasing inputs of all kinds, including water, food, and energy. The ‘energy problem’ has proved to be a central bottleneck for urban development at particular junctures as well as a source of complex and geographically uneven social, technical, and organizational transformations caught up in the transition from one energy system to another. Wood shortage in pre-industrial London constitutes a well-known and intriguing example. Widespread deforestation along navigable rivers in southern England led to the shipment of ‘sea coal’ from Newcastle to London as early as the twelfth century (Cipolla 1993), and certainly long before the onset of industrialism on a wide scale. Likewise, a major seventeenth-century fuel-wood crisis in England led to dramatic increases in coal shipments to London from the Newcastle area and the institutionalization of an elaborate water-based coal transport and trading system, including distribution via canals (see Cowen 2008; Velkar 2006; Cipolla 1993; Flinn 1984).

In Toronto, the energy problem took on particular dimensions shaped by the exhaustion of nearby fuel-wood supplies after the middle of the nineteenth century, as we discuss below. This problem was met not only by substituting coal as a primary fuel, but also by the emergence of oil and the development of long-distance electricity distribution from remote hydroelectric sites. Examining Toronto’s energy transitions after about 1840, and in keeping with the focus of this collection on Toronto’s waterfront, we pay particular attention to the city’s
lakeshore as an energy hub situated within more far-flung relationships in the city’s energy supply networks. This is no mere incidental focus. Rather, Toronto’s waterfront acted as a key node in the city’s energy conversion and delivery systems leading up to and following the turn of the twentieth century. In particular, the waterfront emerged as an important space of flows for energy supplies coincident with the transition from wood to coal as a primary fuel. And yet the development of this role was never linear or pre-given. Toronto’s waterfront instead occupied a shifting place within the city’s evolving energy networks shaped by three dynamic and sometimes contradictory influences: (1) the primary fuel in question; (2) the dominant mode of transportation and distribution, particularly with regard to water-borne shipping versus the railroad; and (3) the spatial pattern of end-use demands for energy and attendant modes of distribution within the city itself.

And yet, throughout, we note the role of substantial portions of Toronto’s waterfront as sacrificial or purgatorial spaces, more suggestive of places forgotten and forsaken than of markers of industrial triumph, necessary but in many ways invisible or overlooked facets of the networked delivery of newfound potencies in the fossil age. This haunting, spectral landscape, more conduit than location per se serves as both contrast and backdrop for more contemporary efforts to resuscitate and integrate Toronto’s waterfront more directly into the social life and spaces of the city. It also stands in marked contrast to urban waterfronts in cities such as Detroit, Pittsburgh, and even nearby Hamilton, as well as with the ambitions and boosterish proclamations of the 1912 Harbour Commission spearheading the creation of Toronto’s Port Industrial District (see Desfor et al., this volume). This contrast speaks to several facets of the role and character of Toronto’s waterfront. First, it is testimony to the waterfront as a space of flows for energy and other inputs to the city as much or more than as a space of industrial agglomeration per se. It also speaks to the character of Toronto as an urban agglomeration with a metropolitan economy (Green 1991: 9) whose industrial might was always balanced by a strong tertiary sector, especially through the presence of trade, finance, government, and a range of high-order services. Toronto’s manufacturing was also biased towards more finished products rather than towards ‘heavy industry.’ Moreover, all branches of manufacturing tended to be quite spatially dispersed (Gad 2004, 1994; Lemon 1990). Finally, the contrast highlights the aforementioned ambivalence of socio-natural networks linking the country and the city in urban modernity. If the delivery of high-quality
energy to Toronto was welcomed as a defining feature of modern urban life (as it unquestionably was), then the relegation of coal piles, oil storage tanks, and large, dirty energy conversion and distribution infrastructure to the waterfront bear witness to the highly fetishized manner in which energy was received.

**Toronto’s Emerging Energy System and the Nineteenth-Century Waterfront**

Until the 1840s, the urban settlement called York and then Toronto relied largely on wood as a primary fuel for heating and cooking. This is true not only of residential energy requirements, but also of those of simple manufacturing processes, including baking, brewing, and tanning. Wood was complemented by wax and tallow candles and by ‘sperm oil’ (from whales, including sperm whales), used for lighting in homes and shops. Fuel wood, especially high-value and energy-dense hardwoods such as white oak, hickory, or ironwood, came largely from the mixed Carolinian forests along the shores of Lake Ontario to the east and west of the city, shipped by schooners into Toronto.

Toronto, however, like London, England much earlier, began to outstrip its nearby wood supplies as it grew, experiencing increasingly acute fuel-wood shortages between the 1840s and 1860s. The cordwood crisis of the late 1860s, in particular, propelled wood supply networks further and further afield. Increasingly, wood was supplied to the city from upper New York State via ships on the return journey across Lake Ontario from grain deliveries in the United States (*Globe* 1847a; *British Colonist* 1843). In addition, both the Toronto municipal and Ontario provincial governments intervened to assist private railway entrepreneurs to establish two new railroads – the Toronto and Nipissing Railway and the Toronto, Bruce and Grey Railway – with specific mandates to transport cordwood to Toronto from as far as 150 to 200 kilometres to the north-east and north-west, tapping into mixed forest and agricultural lands stretching from the Kawartha Lakes to Lake Huron and the Bruce Peninsula.

But while an expanding radius of supply networks fed wood into the city, the shortage also helped precipitate Toronto’s first significant energy transition, that from wood to coal. Coal first appeared in Toronto in the 1830s as a curiosity and luxury item. However, in the 1840s the establishment of the first coal-gas plant signalled the arrival of coal in Toronto as a significant primary fuel. Coal soon became widely used
in Toronto in all sectors of the economy as a direct fuel source, including in households. In addition, it became an important primary energy source used as the basis for energy conversion, including into derivatives or secondary energy such as ‘coal gas’ or ‘town gas,’ and later as a fuel for firing boilers and driving steam turbines in electricity generation. Coal-gas consumption was kick-started by its first use in Toronto street lighting in 1842, spreading to more widespread use in lighting shops, factories, and homes.\(^6\) Gradually, gaslight and later electric light displaced oil lamps, especially kerosene lamps.

The transition to coal was enabled in significant measure by the combination of rising fuel-wood prices and falling transportation costs for coal shipped to the city by both rail and water. As uses for coal grew, total shipments to Toronto increased, reaching 100,000 tons per annum by the 1870s. A renewed fuel-wood crisis in the early 1880s led to deepening coal dependence as the railroad companies also began switching their train engines to coal. By 1891, annual coal shipments to Toronto had reached almost 500,000 tons. Coal became the city’s primary fuel of choice, with consumption passing two million tons per year by the early 1920s (see table 7.1).

Toronto’s primary supplier of coal during this period was Pennsylvania, in the form of both anthracite coal (more popular for domestic use) and bituminous coal (preferred for use in powering trains, but also in brick making). Both kinds of coal were shipped to Toronto increasingly by rail, with water-borne coal declining as a percentage of all coal shipped to the city from half in the 1880s to less than 5 per cent by the early 1920s. Some appreciable amount of coal was also shipped to Toronto from Wales, very likely via cargo ships coming up the St Lawrence River.\(^7\)

Whether coal arrived by rail or by water, Toronto’s waterfront played a key role in the coal energy system. Not only did the coal arriving by ship come to the waterfront; so too did much of the coal arriving directly by rail. This reflects the role of the central waterfront as an important conduit, staging area, and break of bulk point for railroad lines coming into and out of the city, and as a hub for the distribution of coal arriving by both rail and ship throughout the city more generally. Business advertisements and insurance plans of the 1880s and 1890s, for example, show coal trains along the Esplanade in the corridor of land located between the lake and the city across the foot of the central city (see figure 7.1). Ample evidence from the early twentieth century points to railway spur lines or ‘sidings’ leading into most coal and wood yards.
along both sides of the bundle of main-line tracks on the Esplanade. These sidings provided links from the railroad to storage yards used as distribution nodes for delivering fuel to the city more widely, as well as to more proximate energy conversion facilities relying on wood and then coal as a primary fuel – including, for example, coal-gas production and electricity generation.

The structure of this distribution system for coal was very much built upon the prior wood energy system, so much so that most coal dealers listed in business directories, insurance plans, and other records from the period appear as integrated or combined wood and coal dealers. These dealers proliferated after 1870 (see table 7.2) in the form of a network of yards distributed about the city, largely linked via rail lines to the waterfront and, in particular, to the eastern central waterfront. Between the 1840s and 1880s shipments of wood and coal arrived at various locations along the waterfront between Bathurst Street in the west and Parliament Street in the east. In 1856 there were nine important coal and wood dealers on the waterfront; by 1881 there were seventeen.

Table 7.1
Coal receipts in Toronto by water and rail, selected years 1886–1933 (1000 tons)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Water 1000 tons</th>
<th>Water %</th>
<th>Rail 1000 tons</th>
<th>Rail %</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1880</td>
<td>–</td>
<td>0.5</td>
<td>–</td>
<td>50.0</td>
<td>–</td>
</tr>
<tr>
<td>1886</td>
<td>119</td>
<td>31.9</td>
<td>254</td>
<td>68.1</td>
<td>373</td>
</tr>
<tr>
<td>1891</td>
<td>163</td>
<td>33.9</td>
<td>317</td>
<td>66.2</td>
<td>479</td>
</tr>
<tr>
<td>1896</td>
<td>153</td>
<td>25.4</td>
<td>449</td>
<td>74.6</td>
<td>602</td>
</tr>
<tr>
<td>1901</td>
<td>184</td>
<td>23.4</td>
<td>602</td>
<td>76.6</td>
<td>786</td>
</tr>
<tr>
<td>1906</td>
<td>162</td>
<td>13.9</td>
<td>1005</td>
<td>86.1</td>
<td>1167</td>
</tr>
<tr>
<td>1912</td>
<td>122</td>
<td>6.7</td>
<td>1700</td>
<td>93.3</td>
<td>1822</td>
</tr>
<tr>
<td>1921</td>
<td>79</td>
<td>3.3</td>
<td>2321</td>
<td>96.7</td>
<td>2400</td>
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<td>1926</td>
<td>129</td>
<td>5.1</td>
<td>2396</td>
<td>94.9</td>
<td>2525</td>
</tr>
<tr>
<td>1931</td>
<td>560</td>
<td>22.7</td>
<td>1909</td>
<td>77.3</td>
<td>2469</td>
</tr>
<tr>
<td>1933</td>
<td>1326</td>
<td>54.1</td>
<td>1126</td>
<td>45.9</td>
<td>2452</td>
</tr>
</tbody>
</table>

*Presumably short tons of 2000 pounds, or one short ton = 0.907 metric tons.

7.1 Representations of a coal and wood dealer, Elias Rogers and Co., 1885.
By 1881 numerous large coal and wood dealers had become established, with about six to ten of these large firms emerging as the dominant players or ‘majors’ in the Toronto coal and wood trade. By 1880–1 these firms had made a considerable impact on waterfront land use. The wood and coal yards of the majors were particularly important in this respect, with waterfront or docks-area yards ranging from 2000 to nearly 10,000 square metres by 1900 (see figures 7.2 and 7.3). To put this in perspective, very few waterfront manufacturing establishments were of anything approaching this size at the time. The 1885 portrayal of the Elias Rogers Company in figure 7.1, for example, shows a coal train going right into the coal yard north of the Esplanade, while also depicting coal trains on the main railway tracks along the waterfront (Mulvaney 1885). The Patrick Burns company, with its major coal yard at Front Street and Bathurst (somewhat removed from the docks) claimed that it received wood by rail and coal by both rail and water (ibid., vol. 2). Since there is no evidence that Burns had storage space at the nearby Queen’s Wharf, coal arriving by ship was probably carted to the huge Burns yard over a distance of about 500 metres shortly after being unloaded from the boats.

And yet, the majors were multi-locational firms typically with a head or principal order office in the central business district, complemented

Table 7.2
Coal and wood dealers in Toronto, 1856–1928

<table>
<thead>
<tr>
<th>Year</th>
<th>Firms</th>
<th>East</th>
<th>West</th>
<th>Other yards</th>
<th>Offices</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1856</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>1861</td>
<td>15</td>
<td>7</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>1867</td>
<td>13</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>1871</td>
<td>19</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>1875</td>
<td>63</td>
<td>12</td>
<td>5</td>
<td>49</td>
<td>3</td>
<td>69</td>
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<tr>
<td>1881</td>
<td>66</td>
<td>13</td>
<td>4</td>
<td>57</td>
<td>8</td>
<td>82</td>
</tr>
<tr>
<td>1891</td>
<td>97</td>
<td>7</td>
<td>2</td>
<td>70</td>
<td>24</td>
<td>103</td>
</tr>
<tr>
<td>1914</td>
<td>78</td>
<td>9</td>
<td>4</td>
<td>108</td>
<td>ca. 50</td>
<td>171</td>
</tr>
<tr>
<td>1928</td>
<td>123</td>
<td>7</td>
<td>2</td>
<td>167</td>
<td>ca. 50</td>
<td>226</td>
</tr>
</tbody>
</table>

by a series of branch order offices, with a central large coal and wood yard at the waterfront docks, and a series of smaller yards located across the city. Most of these smaller yards were situated at strategic locations where railway lines intersected with arterial roads such as Yonge, Bathurst, Queen, and Gerrard Streets (see, for example, figure 7.1). Again, a look at individual businesses can be instructive. The aforementioned business of Patrick Burns, established in 1856, was by 1885 handling 150,000 tons of coal per year and 35,000 cords of wood while employing 300 people (making the firm one of the larger employers in the city at the time). Burns moved coal and wood from various yards to locations throughout the city by means of 150 to 200 teams using horse-drawn wagons (Mulvaney 1885, vol. 2). Other majors include the
Elias Rogers Company, the P.D. Conger Company (in later years the Conger Lehigh Co.), the Ontario Coal Company, and the Milnes Company (for brief company histories and illustrations of dock yards, see Adam 1891).

Away from the waterfront, coal and wood yards were of course much smaller, typically on the order of approximately six hundred square
metres. Already by 1880, dealers and their branch yards were scattered all over the city, by 1890 appearing in some of the older suburbs, including for example in West Toronto Junction. One outstanding example is a coal and wood yard north-west of the Keele-Dundas intersection evident on the 1890 insurance plan. This establishment with a large coal shed was flanked on two sides by railway sidings that brought coal from the nearby Canadian Pacific Railway line into the shed. The operation was typical of the smaller yards distributed throughout the city, most located in emerging high-density areas not far from retail and service sub-centres in the city with connections to the waterfront hub, and yet also typically (and predictably) well removed and hidden from the more upper- and professional-class neighbourhoods of the day.

Apart from the wood and coal distribution network, energy ‘converters’ also emerged to form an important part of the city’s energy system and waterfront land-use complex. Perhaps the earliest and for a long time the most significant waterfront energy converter was the Consumers’ Gas Company. A predecessor firm established the first coal-gas plant in Toronto in 1841, as noted above, based on a franchise from the City of Toronto for street lighting and using land at the water’s edge south of Front Street between Sherbourne and Princess Streets along the east waterfront. In 1848 the company became Consumers’ Gas and built a new coal gasification facility in the block bounded by Parliament, Mill, Cherry, and Front Streets (just north of the Gooderham and Worts distillery; see Swift 1991). Over time the gas plant spread over several adjacent blocks of land to become a significant presence helping to shape the emerging waterfront energy complex.

Yet the list of significant waterfront energy conversion sites also includes the aforementioned Gooderham and Worts Distillery, arguably the only truly industrial-scale operation serving as an anchor tenant along the east-central urban waterfront. As a very capital-intensive operation whose processes required considerable heat and also internal distribution of grains and liquids, the distillery was a ferocious consumer of wood and coal. Not only was the distillery a major energy consumer; the Gooderham family were also the major business interest behind the Toronto and Nipissing Railway, thus helping to give particular shape to this part of the city’s broader energy system and reinforcing the spatial agglomeration of energy-conversion, energy-storage, and energy-distribution infrastructure along the waterfront.

The city’s waterworks also had its principal pumping station on a wharf at the foot of John Street on the west-central waterfront. In the
last two decades of the nineteenth century, this facility had one of the biggest steam-engine installations in the city and was one of Toronto’s largest coal consumers. Insurance plans clearly show the coal storage areas on the wharf, and in many depictions of the city at the time the plume of smoke from the waterworks pumping station is clearly evident.

In addition, the Toronto Electric Light Company (TELCo) became an important waterfront energy converter, obtaining a franchise from the City of Toronto to provide electric street lighting in the 1880s, successfully displacing Consumers’ Gas in this respect. By 1883 TELCo had built an electricity generating station located along Toronto’s central-eastern waterfront at the foot of Scott Street (Stamp 1991). This plant was also largely powered by coal, first brought to the generating station by rail and from 1898 onward by ship (Globe 1899a). Again, insurance plans from 1890 and 1914 indicate large coal piles and a range of structures for the handling of coal where land and water came together. Toronto’s streetcar company (strangely named the Toronto Railway Company) also became a major source of electricity generated at a thermal power plant. The company built a substantial electric power plant on the east side of Frederick Street between Front Street and the Esplanade in the early 1890s. The plant was marked by a towering smoke stack rising 250 feet, or 76 metres, above the surrounding areas and reputedly the third highest in North America at the turn of the century (Globe 1894d, 1892b).

Toronto’s Diversifying Energy System and the Waterfront into the Twentieth Century

Coal was unquestionably the primary fuel of the late nineteenth century in Toronto, particularly for commercial and industrial processes. However, the arrival of kerosene (primarily used for lighting as a replacement for sperm oil) shortly after the development of Canada’s first commercial oil wells near Petrolia, Ontario, in the late 1850s and early 1860s marked the commencement of Toronto’s reliance on refined petroleum products as a source of primary energy.8 Where the kerosene used in Toronto during the latter nineteenth century was actually refined is not entirely clear, though there were clearly oil refineries in the city. But these were few in comparison to the emerging refinery complex closer to the oil wells in the Sarnia region, and it is highly likely that early refineries in the city were engaged in producing lubri-
cating oils for machinery. All the cartographic footprints we have seen in documents from the period indicate very small refineries and few storage tanks of any size. There were two of these small establishments on the eastern waterfront around Sherbourne Street and another two on the west bank of the Don River between Gerrard and Queen Streets. Consumers’ Gas records also indicate that by 1879 the company had diversified from coal as a primary fuel and was receiving petroleum shipped by rail cars from oil wells in southwestern Ontario to its gas plant on Toronto’s waterfront (see Tucker 1948; and also Goad 1884, sheet 11, with entry ‘Making Gas from Petroleum’). In 1909, Consumers’ Gas opened an additional plant east of the Don River between Eastern Avenue and the new Keating Street, relying on petroleum shipped by rail from the Sarnia area in specialized tanker cars (Tucker 1948). Detailed maps show railway spur lines entering the gas plant’s grounds, with some of the spur lines going straight to large oil storage tanks and others to coal unloading facilities.

The character and scale of Toronto’s oil energy system changed in 1906, however, with the construction of the British American Oil Company refinery for the production of gasoline, other fuels, and lubricating oils on recently reclaimed land at the mouth of the Don River. Toronto Harbor Commission records indicate that the crude oil used in this facility was shipped to Toronto by rail until the 1930s, reinforcing again the role of the waterfront as a transportation, storage, and conversion hub for energy flows into and within Toronto. By the mid-1930s however, crude oil from wells in Oklahoma and Texas appears to have been arriving by ship via ocean tanker to Montreal and then on to Toronto in tankers designed for the Great Lakes (Middleton 1934).

While coal and oil became increasingly important primary fuels whose conversion and distribution systems created appreciable spatial footprints along the waterfront in the late nineteenth and early twentieth centuries, electricity also emerged as an important source of secondary energy around the same period, also with significant infrastructure in the central waterfront. Electricity was first introduced to Toronto in the 1880s, and until 1910 was generated almost exclusively for lighting and mechanical processes from coal, possibly complemented by some use of petroleum as a primary fuel for powering steam engines. But electricity’s role in Toronto’s energy mix was qualitatively transformed with the construction of long-distance transmission lines connecting hydroelectric generation at Niagara Falls to the city, highlighted and celebrated by the 1911 lighting of city hall with
Niagara power (supplemented in the 1920s by hydropower from the Ottawa and Gatineau valleys). Gradually, cheap and reliable hydropower displaced the less-centralized, on-site generation of electricity from coal and petroleum sources. TELCo, for instance, was taken over by the government-owned Ontario Hydro-Electric Power Commission (known later simply as Ontario Hydro) in the 1920s, with HEPCO assuming control of the former TELCo generating station on Toronto’s waterfront. Later in the decade, the power plant was largely demolished to make way for the railway viaduct, signalling an important shift for the eastern central waterfront.

The Evolution of Waterfront Energy Networks before and after the 1912 Waterfront Plan

Beginning in the 1880s, land use along Toronto’s waterfront, including the footprint of energy-related infrastructure, began to change significantly. While the Front/Bathurst Street cluster of energy dealers remained, the most central part of the waterfront district did not. The large Robert Hay furniture factory – formerly Jacques and Hay – which had dominated the west-central waterfront relocated to a new site far from the water’s edge, while the Canadian Pacific Railway expanded to occupy more and more of the city’s west central waterfront land. While the CPR swallowed up lands including that formerly used by the Hay factory, two of the largest coal and wood dealers also had to relocate, moving to waterfront sites east of Yonge Street. A major fire in 1904 finished the remaining manufacturers and wholesale establishments in the district, with the result that almost all of the west-central waterfront (that is, immediately west of Yonge Street) became dedicated to railways infrastructure, anchored by the site of the new Union Station, officially opened in 1931.

The result was a trend, already evident by 1890, towards agglomeration of interlinked energy, transportation, and manufacturing land uses along the central waterfront to the east of Yonge Street. Using a crude land-use classification system and drawing on a variety of plans and inventories of the day (compiled from data for 1889, 1890, and 1891), table 7.3 provides a portrait of these land uses broken down into three sub-zones of the eastern waterfront for 1890 (see also figure 7.4). In aggregate, we estimate that energy networks and infrastructure alone occupied about 22 per cent of the waterfront area stretching from Yonge Street in the west to the Don River in the east, third behind transporta-
Spatial disaggregation of these data, however, allows us to see how energy-related infrastructure had clustered prior to completion of the Ashbridge’s Bay infill and the realization of the 1912 Waterfront Plan. This provides a baseline for comparison after the east waterfront was reconfigured. Table 7.3 shows that exclusively energy-related land uses were most important in the areas closest to downtown, that is, from Yonge to George Streets and from George to Parliament Streets. So too for transportation-related land uses. These patterns reflect the importance of central locations along the waterfront for delivery and storage at or near the aforementioned major energy users and converters, but also for distribution throughout the city along established transportation routes.

The spatial pattern and overall significance of energy-related land uses changed again, however, moving forward into the twentieth century, shaped significantly by the channelization of the Don River, the construction of the Keating Channel, and the completion of the To-
7.4 Land use on eastern waterfront, 1890. (Map by Mark Fram, Department of Geography, University of Toronto)
Toronto Port Industrial District, or port lands. Initially, between 1890 and 1914, energy-related uses increased their hold on the east central waterfront. Manufacturing also gained, influenced most by the dramatic water-ward expansion of the Polson Iron Works, which increased its shipbuilding facility by extending a substantial pier further into the harbour. Polson became the largest single lot occupant, with about 26,000 square metres in 1914; and while clearly a manufacturing facility, the Polson site, like Gooderham and Worts to the east, epitomized the often interlinked character of energy, transportation, and manufacturing, in this case driven by a voracious appetite for coal in its production. The TELCo generating plant was also enlarged at this time, with its power plant occupying about 24,000 square metres. Of the next eight largest lot occupants, seven were coal yards (including one coal and ice dealer) and another western outlier of the gas works.

After the First World War, the energy-waterfront complex shifted east as a result of both push and pull factors. The lots of the largest land-users were becoming bigger and bigger, leading to considerable congestion in the east-central area and pushing development further to the east. At the same time, the 1912 Waterfront Plan and the policy of railway grade separation made it impossible to land coal or even to bring it to the central waterfront by rail. The role of the east-central waterfront as an energy conversion and distribution hub for the city was further eroded by collapse of the Polson Iron Works after the First World War (as the result of a loss of shipbuilding contracts; see Moir, chapter 4, this volume), and by the conversion and downgrading of the former TELCo generator to a transformer station in 1922. Only Consumers’ Gas remained as a vestige of the earlier energy complex along Toronto’s more central waterfront.

By contrast, land was opening up for energy-related development further to the east. A key influence came in the form of the Port Industrial District, planned in 1912 and slowly constructed over the next twenty years. This major initiative, promoted by a coalition of Toronto’s economic and political elites and coordinated under the auspices of the Toronto Harbour Commission (see Desfor et al., this volume), opened up land around the newly configured mouth of the Don River, with north-western portions of this decidedly produced space ready for occupancy before the end of the war. Among the first occupants was an electric-arc-furnace steel plant. The plant did not prove economically viable, however, and soon after the war the site became host to Toronto’s second large oil refinery, operated by the McColl-Frontenac Oil
Company. Plant B of Consumers’ Gas was built in 1909 on land to the east of the Don River, while a new BA oil refinery went in just to the north of the still new Keating Channel. At roughly 125,000 and 75,000 square metres respectively, these facilities anchored an energy cluster forming around the emerging, planned spaces of the east waterfront at the mouth of the Don River. Four coal yards were established by 1928, followed by more in the 1930s, accompanied by oil- and gasoline-tank farms. By 1939 (according to the 1940 City Directory), there were twenty-four coal and ice dealer establishments, one oil refinery, and seven oil storage establishments in the port lands, which had become, essentially, one large energy storage and supply centre.

The colonization of the new port lands as an energy hub, more of a staging area for energy provisioning than for industrial activities per se, was in many ways propelled by the resurgence of water-borne coal deliveries to Toronto’s waterfront. With the opening of the Welland Canal in 1931, larger and more economically efficient carriers capable of transporting five to ten thousand tons of coal could travel between Lake Erie and Lake Ontario. In Toronto, these ships were offloaded at the new harbour facilities constructed as part of the Port Industrial District project. And yet, the port lands facilities and coal docks were more remote from the central city than the coal docks and yards of the old east-central waterfront. Thus, critical to the emergence of the port lands as an integral part of Toronto’s energy system was the emergence of the motorized truck as a more flexible and eventually dominant carrier of coal and petroleum products for distribution throughout the city.

By 1949, we estimate that two-thirds of the two-square-kilometre area of the port lands were serving energy-related uses (see figure 7.5). Primary users were the oil companies, who occupied nearly 68 hectares or 35 per cent of the port lands, followed closely by 17 coal yards and one ice dealer accounting for just less than one-third of the area. The apex of the port lands as Toronto’s waterfront energy-provisioning hub may well have been the construction of the coal-fired Richard L. Hearn thermal generating station in the 1950s. During its first phase of operation the plant had a capacity of 188 MW, expanded to 1.2 GW by 1961 and consuming approximately three million tons of coal per year. In 1971, just beyond the end date of this chapter, the entire generating station switched to natural gas as a fuel for generating electricity, although four units retained the option to burn coal.
7.5 Major land uses in Port Industrial District, 1949. (Map by Mark Fram, Department of Geography, University of Toronto)
Conclusion

If the construction of the Hearn Electric Generating Station signified the peak of the eastern waterfront and port lands as an energy delivery, storage, conversion, and distribution hub for Toronto, the conversion of the plant to a natural-gas-burning facility in 1971, largely as a result of protests over air pollution, also highlighted another turn. In the two decades before this conversion, one after another, coal yards had closed across the waterfront as coal declined as a primary fuel. In 1954, Consumers’ Gas shut down its two plants on the old east-central waterfront as well as one on Eastern Avenue. The city’s two oil refineries, both near the mouth of the Don, were also laid still, displaced by lake-side plants along the waterfronts of Mississauga, Oakville, and Burlington to the west. Natural gas, the third fuel in the fossil revolution, became more widely available in Toronto, arriving by pipeline and distributed throughout the city via an extensive underground grid from a massive inland terminal near the northern boundary of the city. Henceforth, more than ever, energy would come almost magically by nearly invisible means into homes, offices, hospitals, and universities.

The decline of Toronto’s waterfront as an urban energy hub in recent decades bears all the hallmarks of a changing spatial fix for the movement of energy (and other) commodities within the urban landscape. Key elements of the new order included the larger refineries to the west; a modern road network and the urban hegemony of the automobile (particularly trucks in this context) in the post–Second World War era; and the distribution of natural gas via long-distance pipelines and buried intra-urban lines. Though fossil fuels remain dominant, in some respects the prominence of refined petroleum and natural gas in the later fossil era constitutes as significant a departure from the coal energy system as did the coal energy system from the wood-based system before it. And true to the character of spatial fixes, each transition has been constituted by significantly different spatial arrangements. Put another way, and reinforcing one of our key themes, energy transitions are also geographical transitions, in this case reworking the urban landscape and in particular giving shape to the production of space along Toronto’s waterfront.

And yet, there are important continuities here in thinking about the broader cultural politics of space and nature under the influence of cyborg urbanization. Contemporary pressures to redevelop Toronto’s waterfront are propelled in no small measure by changing sensibilities.
about urban sustainability, nominally green amenities and lifestyles (increasingly for affluent and middle-class residents living in larger numbers along the water’s edge), and a revaluation of waterfront land as real estate, itself a form of spatial fix. Waterfront redevelopment is a complex material and semiotic process. And yet the material bases of emerging waterfront lifestyles and amenities continue to come via complex urban socio-technical provisioning systems for water, food, materials, and, of course, energy. And though energy must be provided to shops, dance clubs, condominiums, streetcars, and the like, it does so in ever less visible and increasingly taken-for-granted ways.

The almost magical appearance of contemporary energy for myriad uses enables the mystification and fetishization of energy, powerful cultural processes seemingly only disrupted by the emergence of global climate change as perhaps the most important issue of the day. This points to a paradox of technological modernity highlighted by the work of Gandy, Kaika, Swyngedouw, and others. Huge amounts of social labour and capital are invested in sustaining urban life, and yet, equally, these investments tend towards making less visible the necessary provisioning systems. If and when works of engineering are celebrated, it is typically in spectacular fashion and in ways that help to reinforce the magical illusion of emancipation. Toronto’s waterfront, by acting as a central delivery, storage, conversion, and distribution hub for energy between about 1840 and 1970, was in this respect a central spatial technology of cyborg urbanization, a hybrid liminal space between land and water, city and country, culture and nature, mediating between energy uses (and users) on the one hand and energy provisioning on the other. Never really host to the large industrial agglomerations typical of more truly industrial waterfront cities, and cut off from much of the social life of the city, Toronto’s waterfront in this sense epitomized and embodied the ambivalence directed at modern socio-technological networks. And though the waterfront is now becoming more an amenity space, its past begs that we ask what has really changed.

NOTES

1 It bears noting that our terminology and conceptualization of the conjoined production of space and nature here draws not only from Harvey (1989b, 1982) and Lefebvre (1991) but also centrally from Neil Smith (2008, 1996) and his insistence on understanding the inter-twined production of
space and the production of nature as received material and ideological
geographies of capitalism. For an extraordinarily lucid discussion of modernization as an active fusion of nature and society in historical-geographical materialism, see Swyngedouw 1999.

2 Indeed, Kaika and Swyngedouw (2000) reference passages describing the Harris filtration plant in Michael Ondaatje’s *In the Skin of a Lion*, a novel which also traces some of the social and cultural ambiguity of such modernist projects by exploring the role of immigrant labour and racialized class conflict in their construction.

3 Harvey’s (1989b, 1982) notion of the spatial fix and the spatio-temporal fix is a broad, multifaceted one (see Jessop 2006 for a critical review). We invoke specifically his attempt to capture how social capital is sunk into relatively long-lived investments in an urban context. Schoenberger describes this facet of the idea as ‘the creation of an expanded and improved built environment – investment in the whole suite of physical installations that sustain and enhance the system’s ability to create wealth. This includes, for example, transportation networks, water supply, waste disposal systems, communications systems and the like. The beauty of this form of the spatial fix is that it is so intensely grounded’ (2004, 429).

4 We agree with Holden and others in emphasizing that while absolute physical quantities of fossil energy sources may not be exhausted anytime soon, the increasing social, environmental, and technical costs of exploiting these resources into the future has effectively brought to an end the era when sufficient, high-quality energy from fossils can be assumed.

5 We do not posit that a singular energy problem has confronted and does confront all cities across historical time and geographical space. In fact, quite the opposite. Different cities with different socio-technical characteristics induce their own distinct energy problems, albeit often embedded within broader institutional and technological contexts or chains of causation. In fact, the most pressing dimension of energy problems does not always pertain to mobilizing sufficient fuels per se; instead, as is the case in many contemporary cities, more pressing issues may arise around the environmental and human health consequences of particular energy-using and energy-converting technologies (e.g., urban smog from internal combustion engines).

6 Coal gas was extracted by baking coal in a retort or oven without oxygen at temperatures of about one thousand degrees Celsius. The extracted gas was collected in gas holders or ‘gasometers’ and then distributed throughout the city by an underground network of pipes. In the coal-gas energy cycle, coal served a dual purpose. First, it contained the primary
energy source extracted in the form of volatile gases, but also, second, coal provided the process heat to drive the gases out. In 1841 a Montreal-based company was franchised by city council to provide Toronto with gas street lights. The first gas plant was built in 1841, and in 1842 the gaslights were in use (Swift 1991).

7 From table 7.1 it is also evident that the delivery of coal by ship experienced a renaissance both in absolute quantity and in its share of modal split compared to rail shipments after 1931. This would seemingly correspond most directly with the opening of the Welland Canal, which allowed faster and more efficient shipping via Lake Erie into Lake Ontario, but also with the opening of new quays and storage areas in the newly manufactured industrial waterfront spaces including and surrounding the Keating Channel.

8 For an account of the role of kerosene in displacing whale oil in lamps and in kick-starting the age of oil more generally, see Yergin 1991.

9 The actual site of this refinery north of the Keating Channel and just east of Cherry Street was obliterated by the construction of the Gardiner Expressway and the multi-lane Lakeshore Boulevard in the 1960s.

10 For example, the Canada Foundry generated electricity on its factory site at Lansdowne and Davenport, and the 1914 insurance plan showing the Christie Brown biscuit factory bears the inscription ‘electricity generated on premises.’ The Eaton Department Store and factory complex at Queen and Yonge also had its own generating facilities (see Stamp 1991).

11 That is, facilities primarily or exclusively dedicated to energy delivery, storage, and conversion. This includes coal and wood yards or docks (but not lumber dealers), ice dealers and ice houses, gas works and thermal electricity generation, and a few fairly small oil refineries or oil merchants. We realize, however, that this classification underestimates the importance of energy provisioning as an influence on emerging urban waterfront spaces in so much as transportation, energy, and manufacturing were interlinked through energy provisioning via the role of transportation networks in distributing energy to and throughout the city, on the one hand, and the energy-intensive demands of manufacturing facilities. We attempt to address this in the text by referring more generally to the clustering of energy, transportation, and manufacturing land uses in particular configurations.

12 By 1930, new land created south of the old docks and the new railway viaduct cut off the central city from the water. The construction of the railway viaduct was ordered by the federal government’s Board of Railway Commissioners to achieve grade separation between the railway and street
traffic. The viaduct became a major physical barrier between businesses, especially the coal dealers, and the edge of the water, where vessels could land coal and wood (see Stinson and Moir 1991; Lemon 1985).

13 It should be said that some characterize the era of wood as the era of muscle power (human and animal) as well (for discussion see Huber 2009a).