

# Electrifying Kyoto: Business and Politics in Light and Power, 1887-1915

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# Electrifying Kyoto: Business and Politics in Light and Power, 1887–1915

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CHENXIAO XIA

The city of Kyoto witnessed Japan's first public-owned electric utility and first hydraulic station for general supply, and was the first Japanese city in which every household became electrified. Behind these achievements, the interaction between the privately owned Kyoto Electric Light Company and the government-owned Kyoto Municipal Electric Works were important. By exploring their origin, collusion, competition, and demarcation between them from 1887 to 1915, this article addresses business–government relations in the history of Japanese electrification through the case of Kyoto.

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## Introduction

The city of Kyoto reached 100 percent residential electrification in 1915, at a time when in Berlin only 5.5 percent of households was electrified.<sup>1</sup> Two decades later, residential electrification rate

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1. For statistics on Kyoto, see Kyoto furitsu sogo shiryokan, *Kyotofu tokei shiryō shu* (Historical statistics of Kyoto prefecture), 297. For data on Berlin, see Hughes, *Networks of Power*, 190.

approached 89 percent in Japan, higher than in Germany (85 percent) and in the United States (68 percent).<sup>2</sup> Kyoto electrified rapidly, as did Japan. Thus, to study Japanese electrification, Kyoto provides an important case study.<sup>3</sup>

These statistics do not reveal the role of governments, which varied tremendously across nations. The case study of Kyoto again represents a Japanese experience; for example, the Kyoto Municipal Electric Works was the only government-owned electric utility in Japan before 1906. In comparison, by the end of the nineteenth century, in German cities with populations of over 100,000, 62 percent of electric utilities were government-owned.<sup>4</sup> Additionally, starting in the 1880s, electric utilities in most German and U.S. cities were regulated by municipal franchises; meanwhile, in Kyoto, the franchise, as a regulation model, appeared late and was short-lived. Furthermore, in the 1910s, fierce competition took place between the government-owned Kyoto Municipal Electric Works and the privately owned Kyoto Electric Light Company, while in Western countries electricity is normally considered a natural monopoly.<sup>5</sup> The different business–government relations gives rise to two key questions. The first is: What explains the ownership structures of electricity? The second is: What explains the regulation model of electricity?

This article explores the history of Japanese electrification through the case study of Kyoto from 1887 to 1915, and focuses analytically on

2. These data are for 1935. See Zängl, *Deutschlands Strom* (Germany's electricity), 76; Kozakura, "Nihonshihonshugi kakuritsuki niokeru denryoku kokkaseisaku no keisei to toshidenkigyo tosei" (Japanese national electricity policy formation and municipal electricity regulation in the making period of state capitalism), 107.

3. There is limited literature in English on Japan's electricity industry. These include Uchida, "Transfer of Electrical Technologies"; Kikkawa, "Management and Regulation"; Kikkawa, "Matsunaga Yasuzaemon." The most representative works in Japanese are Kikkawa, *Nihon denryokugyo hatten no daiamizumu* (Development of Japanese electric industry); Kikkawa, *Nihon denryokugyo hatten to matsunaga yasuzaeomon* (Development of Japanese electricity industry and Matsunaga Yasuzaemon); Watari, *Senzenki no wagakuni denryokudokusentai* (Electricity monopolies in prewar Japan); Umemoto, *Senzen nihonshihonshugi to denryoku* (Electricity and capitalism in prewar Japan); Nakase, *Nihon denki jigyou keieishi* (Business history of Japanese electricity industry).

4. On the German statistics, see Ambrosius, *Der Staat als Unternehmer* (The state as entrepreneur), 45–47. On the Japanese statistics, see Kikkawa, *Nihon denryokugyo hatten no daiamizumu*, 107.

5. For example, by the turn of century, the consensus in the United States was that electricity should be a monopoly and, therefore, the government should regulate it. Neufeld, *Selling Power*, 4.

business–government relations.<sup>6</sup> The period covers when residential electrification in Kyoto rose from zero to 100 percent. Research included reviewing published government records, company histories, and statistical yearbooks.

The structure of the article is organized as follows. First, the origination stories of the two main players, Kyoto Electric Light Company and Kyoto Municipal Electric Works, are introduced. The article then discusses their collusion, competition, and demarcation from 1887 to 1915. Kyoto is put in context through comparisons between it and other Japanese cities; and the article ends with conclusions.

### Between Business and Politics

Kyoto Electric Light Company (KEL), the third-oldest Japanese electric utility, was founded in November 1887.<sup>7</sup> Its cofounders, Takagi Bunpei (1843–1910), Tanaka Gentaro (1853–1922), Nakamura Eisuke (1849–1938), and Ozawa Zensuke (1853–1934), were capitalists with strong personal networks with the local government. Takagi was chairman of the Kyoto Chamber of Commerce and a member of the Kyoto Municipal Council. Tanaka was chairman of Kyoto Prefectural Assembly and cofounder of local financial infrastructures, including the Kyoto Stock Exchange and the Bank of Kyoto. Nakamura was senator in the prefectural assembly and later was the chairmen of the municipal council. Ozawa was a senator in the prefectural assembly. All of them were businessmen and politicians, and their profiles represent the business–government connections behind the start of Kyoto’s electrification.<sup>8</sup>

Kyoto’s local government promoted the formation of KEL. The local governments of Kamigyo and Shimogyo bought KEL’s stock when the company could not find enough investors confident in the

6. Here, business–government relations denote the interaction among the central government, local governments, and privately owned electric utilities in ownership, management, and regulation. This definition is borrowed from Hausman, Hertner, and Wilkins, *Global Electrification*, 23. I also adopted the framework suggested by Millward, “Business and the State.”

7. For a chronology of Japan’s electric utility industry, see Kurihara, *Denryoku* (Electricity), 38–74. For a list of early electricity firms, see Kikkawa, *Nihon denryokugyo hatten no dainamizumu*, 32–33.

8. For a list of Kyoto mayors and municipal council chairmen, see Kyotoshi, *Shisei no keisei* (History of Kyoto: Formation of municipal administration), appendix, 26–29. For a list of KEL’s directors, see Kyoto dento, *Kyoto dento kabushikikaisha gojunenshi* (Fifty years of Kyoto Electric Light Company), appendix “rekidai yakuin” (Record of board members).

future of electricity; these governments owned 6 percent of KEL.<sup>9</sup> In Japan, local governments actively promoted the start of electrification. For example, the Tokyo prefecture coordinated two groups of capitalists that competed with each other for concessions<sup>10</sup>; and the Nagoya prefecture provided credit to local capitalists to enable them to create the Nagoya Electric Light Company.<sup>11</sup> However, local governments usually went no further than providing credit or acting as coordinators. The private–government mix of ownership of KEL was exceptional, but the municipal government was not involved in its management.

Japanese electric utilities had a centralized regulation structure, which is why local governments' role was small. The 1880s was the final period when prefectural governments could grant concessions, because in 1896 the Ministry of Communications centralized this authority.<sup>12</sup> Investors and governments seeking to set up new electric utilities had to apply for concessions from the Ministry of Communications, which could, according to policy, veto or allow the applications. Additionally, the Meiji government forbade foreign ownership of Japanese equities and land until 1898, thus making foreign direct investment in Japan's electric utility industry nonexistent.<sup>13</sup>

Although capital did not flow across international borders, people, ideas, and machines did. The quality of electric engineering education in Japan was perhaps among the highest in the world at that time, thanks to William E. Ayrton (1847–1908), a British engineer who taught at the Division of Electricity at the Tokyo Imperial College from 1873 to 1878.<sup>14</sup> By 1890 the chief engineers of Japanese

9. Kyoto dento, *Kyoto dento*, 19. When KEL was founded, the city of Kyoto did not yet exist; its municipal administration was not established until 1889. Kamigyō and Shimogyō were consolidated into Kyoto City, and their joint assembly was reorganized into the Kyoto Municipal Council. The official record of the council, *Kyoto shikai gijiroku* (Kyoto Municipal Council Minutes) was the primary recording of the municipal government's decision-making process.

10. Tokyo dento, *Tokyo dento kabushikikaisha kaigyō gojunenshi* (Fifty years of Tokyo Electric Light Company), 4–13.

11. Toho denryokushi hensankai, *Tohodenryokushi* (History of Toho Electric Power Company), 8–11.

12. Umemoto, *Senzen nihonshihonshugi*, 10–11.

13. See Takenaka, *Jimensu to meijinihon* (Siemens and Meiji Japan), 159. Japan opened its doors to foreign direct investment (FDI) in electric manufacturing in 1898, but no Japanese electric utility industry received FDI before 1945. The only record of a project of an international joint venture in Japanese electric utility was the Anglo-Japanese Hydroelectric Power Company in 1909, but it was a fruitless collaboration. See Hausman, Hertner, and Wilkins, *Global Electrification*, 366–367.

14. For a short biography of Ayrton, see Hughes, *Networks of Power*, 146. For an evaluation of his contributions to Japanese electric engineering and of the level of electric engineering education in Japan, see Uchida, "Transfer of Electrical Technologies."

utilities were, without exception, graduates of the Tokyo Imperial College, and many were former students of Ayrton. Electrical engineers were usually members of the Institute of Electric Engineers of Japan, which was founded in 1888 and played important roles in translating and spreading academic knowledge of electrical engineering through meetings and journals.<sup>15</sup> However, because of Japan's weak manufacture of electric equipment, it had to rely on imported machines and equipment.<sup>16</sup>

By 1895, about a decade after the start of Japan's electrification, there were thirty-three privately owned utilities. Their assets ranged from 15,000 yen (e.g., in the small city of Toyohashi) to 1 million yen (e.g., Tokyo Electric Light).<sup>17</sup> With capital assets of 200,000 yen, KEL was ranked sixth among electric utilities and was among the 100 largest Japanese firms ranked by asset.<sup>18</sup> Most of the capital-intensive electric utilities relied primarily on issuing stocks, and the burgeoning stock exchanges in Tokyo, Osaka, and other big cities catered to the financial needs of electricity firms.<sup>19</sup> During the period under investigation, large shareholders, who were mostly local capitalists, managed Japanese utilities such as KEL; and the industry has been dominated by privately owned and managed enterprises ever since. The worldwide business model in which electric manufactures built, operated, and financed electric utilities with German and U.S. FDI did not occur in Japan.<sup>20</sup>

### Government as Entrepreneur

In the 1890s, the Kyoto Municipal Electric Works (KMEW) was the only government-owned utility in Japan, and its founding represents local government entrepreneurship. In 1888 Tanabe Sakuro (1861–1944), the chief engineer of Kyoto's civil project Lake Biwa Canal, learned of the world's earliest hydroelectric stations in Switzerland

15. For a history of the Institute of Electric Engineers of Japan, see Denkgakkai, *Denkgakkai gojunenshi* (Fifty years of Institute of Electric Engineers of Japan).

16. For Japan's electric machine making in the 1890s, see Uchida, "Transfer of Electrical Technologies," 233–239.

17. For a comprehensive list of the Japanese electric light companies in 1895, see Denkgakkai, *Denkgakkai gojunenshi*, 469–470.

18. For a list of the 100 largest Japanese industrial firms, see Keieishigakkai, *Nihonkeieishi no kisochoishiki* (Primer in Japanese business history), 398–399.

19. For an overview of the corporate finance of Japanese utilities, see Kikkawa, *Nihon denryokugyo hatten to matsunaga yasuzamon*, 28–47.

20. For German and U.S. FDI business models, see Hausman, Hertner, and Wilkins, *Global Electrification*, 53–54.

and the United States. He successfully persuaded the city government to send him to the United States to study hydroelectric technology. Returning from the United States, Tanabe, a former student of Ayrtton, convinced the municipal council that Kyoto should and could build a hydroelectric power station on the Lake Biwa Canal. This is how Japan's first government-owned electric utility and hydroelectric power station for general supply was founded in 1889.<sup>21</sup>

The technological achievements of KMEW were recognized by academic communities in Japan and overseas. In 1892 the Institute of Electric Engineers of Japan invited Tanabe to give a keynote speech.<sup>22</sup> In 1894 Tanabe reported on the municipal electric works in a pamphlet, *The Lake Biwa Kioto Canal*, which was published by the London-based Institute of Civil Engineers.<sup>23</sup> In 1907 the Deutsches Museum exhibited miniatures of Japan's Lake Biwa Canal and Sweden's Trollhättan Canal, introducing each of them to the German public as a "masterpiece of natural science and technology."<sup>24</sup>

KMEW occupied a significant place not only in the history of Japanese electrification but also in the history of Kyoto's municipal finance, as the city's first municipal bonds were electricity bonds. In 1889 it issued a short-term municipal bond in the amount of 204,500 yen to cover the budget for new electric works; meanwhile, the total municipal income in that year was 331,971 yen.<sup>25</sup> A year later, Kyoto raised a long-term municipal bond in the amount of 531,300 yen to cover additional construction costs for electric works. Until 1913 all of Kyoto's municipal bonds were electricity bonds.

In the Japanese context, Kyoto was an exception when it opened a government-owned electric utility. In the 1890s, electricity was still a very uncertain technology. In Germany, for example, local governments usually had private entrepreneurs bear the initial risk, and did not make electricity a municipal utility until after it became profitable.<sup>26</sup> In Kyoto, however, the municipal government considered electricity as a symbol of modernization, and so it bore the risk to set up, operate, and finance an electric utility. The municipal council expected a financial return, but KMEW kept losing money

21. For details of Tanabe's U.S. trip and its implications, see Kyotoshi, *Biwako sosui oyobi suiryoku riyo jigyo* (Biwa Lake Canal and the use of water power), 623–624. The trip to Switzerland did not happen because of budgetary reasons.

22. Tanabe, "Kyoto denki suiryoku koji" (Hydroelectric works in Kyoto).

23. Tanabe, *Lake Biwa Kioto Canal*.

24. Nishikawa, *Tanabesakuro hakase rokujunenshi* (Biography of Dr. Tanabe Sakuro), 116–117.

25. Kyotoshi, *Zaiseino ayumi* (History of Kyoto: Finance), 24–26, 34.

26. See Hughes, *Networks of Power*, 175–200.

until 1897.<sup>27</sup> Other Japanese cities found Kyoto's example hard to follow. The second-oldest government-owned utility was launched in the northeastern town of Sakata in 1907, nearly twenty years after Kyoto's. It was not until the 1910s that electricity became a public infrastructure providing stable income, which provided the incentive for government ownership. However, compared with Germany and the United States, government ownership in Japan remained weak even after the 1910s.<sup>28</sup>

### Collusion

The early 1890s were hard years for both KMEW and KEL. For example, KMEW in the beginning sold electric power, but it had no customers except for a canal slope on the Lake Biwa Canal and a private clock workshop, which happened to be owned by Ozawa Zensuke, head of KEL (Table 1). Meanwhile, the electric light producer KEL also fell into financial difficulty. After a fire at the Imperial Diet in Tokyo, new applicants for KEL's electric lighting slumped nationwide. Gas lamp, oil lamp, and candle producers jumped at the chance to expand their market share.<sup>29</sup>

In 1892 KEL signed a ten-year contract with the Kyoto Municipal Council, which also oversaw KMEW. The contract, proposed by Ozawa Zensuke, was to relieve the difficulties for both utilities.<sup>30</sup> According to the contract, KMEW would wholesale electricity to KEL at a favorable price.<sup>31</sup> KMEW charged KEL 2.46 yen per horsepower, while the price was normally 3.55 yen per horsepower. KMEW's pioneering, and cheap, hydroelectricity enabled KEL to reduce greatly the lighting tariffs in the 1890s. Hydroelectricity costs remained unaffected by the Sino-Japanese War (1894–1895), which drove up coal prices by about 200 percent.<sup>32</sup> By the turn of the century, electricity in

27. Kyotoshi denkiyoku, *Kyoto shiei denkiijigyo enkakushi* (History of the Kyoto Municipal Electric Works), 706–707.

28. In Germany in 1933, the federal and local governments controlled 90 percent of the electricity supply. In the United States, 40.6 percent of the supply was privately owned, 55.7 percent was communally owned, and 3.7 percent was owned by cooperatives, although most of the communal and cooperative works were small power distributors. In Japan in 1937, 83.6 percent of the supply was privately owned and only 16.4 percent was government-owned. For more on these statistics, see Ambrosius, *Der Staat als Unternehmer*, 71; Kikkawa, *Nihon denryokugyo hatten no dainamizumu*, 107; Kwoka, *Power Structure*, 5.

29. Tokyo dento, *Tokyo dento*, 54–57.

30. Miura, *Ozawazensuke* (Biography of Ozawa Zensuke), 41–42.

31. *Kyoto shikai gijiroku*, March 6, 1893.

32. Toho, *Tohodenryokushi*, 19.



Table 1 Contracted load of Kyoto Municipal Electric Works, from 1891 to 1898 (in horsepower)

Year	1891	1892	1893	1894	1895	1896	1897	1898
Canal slope	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Clock manufacturing	100	1,000	1,500	2,360	3,550	750	2,300	2,300
Incandescent lamp		9,000	19,200	36,080	40,920	44,420	56,920	56,920
Silk weaving		3,550	5,050	5,100	5,925	16,230	16,325	18,325
Silk spinning			2,860	6,341	7,450	7,440	9,400	11,800
Metal working			1,050	1,150	1,550	4,625	5,150	5,800
Arc lamp (street light)				400	2,500	2,500	2,500	2,500
Pumps				760	1,800	1,650	1,750	1,750
Cotton spinning					10,000	30,000	33,400	32,900
Printing					400	1,875	1,975	3,175
Rice mills					150	150	900	900
Machine making					400	1,093	875	875
Electric railway					20,000	20,000	20,000	20,000
Tobacco manufacturing						2,310	10,000	10,000
Other		150	500	1,050	4,674	15,497	18,878	24,374
Total	3,600	17,200	33,660	56,741	102,819	152,040	183,873	195,119

Source: Kyotoshi denkiyoku, *Kyoto shiei denkiijigyo enkakushi* (History of Kyoto Municipal Electric Works), 589–593.

Kyoto was the cheapest form of lighting in Japan. For a sixteen-candle light lamp, a resident paid 3 yen per month in Tokyo, 1.7 in Osaka, 2.5 in Yokohama, and 2.1 in Kobe, but only 1 in Kyoto.<sup>33</sup> One drawback, however, was that the contract created a temporary dependence of KMEW on KEL. It was not until 1895 that the shares of KEL in KMEW's total contracted load dropped below 50 percent, largely due to the opening of the Kyoto Electric Railway Company. The honeymoon between KEL and KMEW was extended when the city approved KEL to build the city's first electric streetlights,<sup>34</sup> which were not yet common. Tokyo, for example, still had a budget for gas lighting in 1893.

The relationship between KMEW and KEL became a provocative topic for debates in the municipal council. Political opponents of Ozawa submitted a series of bills aimed at either taking over KEL or allowing KMEW to retail electric lighting, thus initiating competition with KEL.<sup>35</sup> These bills were all voted down, some by small margins; some were first approved but then rejected several days later after pro-KEL parties submitted counter-bills. The relationship between the two utilities became an instrument of political dispute. Eventually, the municipal council reached a gentlemen's agreement with KEL in 1893; via self-regulation, each would henceforth be confined to one market field: the KEL in lighting, and the KMEW in power.<sup>36</sup>

However, this market division was both unusual and shortsighted, because in the 1890s electric light companies were transforming to combined light and power companies, which was more efficient. This usually required changing to alternating current (AC) systems from direct current (DC) systems.<sup>37</sup> The former reaches economies of scale and scope by enabling a unit of generators to supply electricity for light and power at the same time through a centralized distribution network. The latter requires different generators and networks for different kinds of consumption and therefore has higher costs. Tokyo Electric Light (TEL) installed 50-cycle AC generators manufactured by AEG in 1895. Two years later, Osaka Electric Light (OEL) installed 60-cycle AC generators manufactured by General Electric. The influence of TEL and OEL, the two biggest utilities, thus settled the battle between AC and DC systems in Japan. Both TEL and OEL became electric light and power companies with a centralized

33. These data are for the year 1900. See Kyoto dento, *Kyoto dento*, 64.

34. Kyotoshi denkiyoku, *Kyoto shiei*, 822.

35. Ozawa recalled in his autobiography that these were the toughest days in his life. See Ozawa, *Kaiko nanajugonen* (Memoir of my seventy years), 74–76.

36. For the details of debates, see *Kyoto shikai gijiroku*, March 6, March 7, July 27, and August 1, 1893.

37. See Kikkawa, *Nihon denryokugyo hatten no dainamizumu*, 42–43.

production and distribution system. However, the gentlemen's agreement between KEL and KMEW hindered their transformation to a more efficient system. For example, in 1903 KMEW still had nineteen small-scale generators for different purposes, for example, from spinning, to tramway, to ice making, to weaving, and to cigarette making. Its power production and distribution was decentralized because the cycle of these machines ranged from 133, 125, 60, and 50 Hz, and they required separate distribution networks.<sup>38</sup> KEL and KMEW confined each other to one market field, when electric utilities in other cities were learning that it was more efficient to sell light and power at the same time. Ironically, although Kyoto was a first-mover in many fields of electrification, in the 1900s it was the least electrified of the six biggest Japanese cities (Table 2).

## Franchise

In a comparison to Germany and the United States, Japan's electric utilities were born in a municipal regulatory vacuum. In Germany and the United States, municipal governments normally regulated electric utilities from the beginning; and these governments also owned and managed public roads, which were necessary for the electric utilities to lay distribution systems. The governments' rights of way gave rise to the regulation model of municipal franchise.<sup>39</sup>

A franchise could include agreements on utility' usage of public passageways, governments' tariff regulation, governments' claim of a part of the utility's profit, and conditions of government takeover.<sup>40</sup> In Japan, on the other hand, ownership of public roadways was ambiguous when electrification started. Japan's utilities received concessions from the national government, but the legal basis was not in rights of way but in political structures, and these concessions did not involve legal obligation to the municipal governments. The municipal governments were content with not being regulators yet receiving compensation though the electric pole tax, which began in 1895.<sup>41</sup>

38. These data are from 1903. See the pamphlet in English prepared by the Kyoto Municipal Council: Kyotoshi sanjikai, *Lake Biwa Canal*, 6–7.

39. Neufeld (*Selling Power*, 47) defines franchise as “a legal contract between the city and the utility that could include any conditions accepted by both sides.” German scholars regard franchising (*Konzessionsvertrag*) as private law contract; see Fischer, *Die Geschichte der Stromversorgung* (History of electricity supply), 170–172.

40. See Hughes, *Networks of Power*, 185–186 for the case of Berlin, which laid the model for franchises in other German cities.

41. Hagiwara, *Osaka dento kabushikikaisha enkakushi* (History of Osaka Electric Light Company), 466; Toho, *Tohodenryokushi*, 26–27; Tokyo dento, *Tokyo dento*, 75.

Table 2 Residential electrification statistics in the six largest Japanese cities, 1909 and 1917

Year: 1909					
City	Population	Number of bulbs	Number of electrified households	Total households	Electrification rate
Tokyo	1,623,079	427,252	97,128	429,127	23.6%
Osaka	1,204,557	272,092	94,431	277,085	34.1%
Kyoto	441,465	41,595	11,387	82,068	13.8%
Yokohama	394,303	87,480	17,467	78,136	22.4%
Nagoya	378,231	54,937	16,711	84,438	19.7%
Kobe	378,197	67,061	18,100	96,539	18.8%
Year: 1917					
Tokyo	2,050,126	1,631,212	408,576	519,735	78.6%
Osaka	1,395,823	763,552	215,174	300,768	71.5%
Kyoto	509,038	303,019	88,992	91,105	97.7%
Yokohama	397,574	223,591	75,562	82,966	91.1%
Nagoya	452,043	182,781	78,858	97,114	81.2%
Kobe	420,167	277,571	98,570	102,421	96.2%

Sources: For 1909, see Kyoto denki, *Kyoto denki kabushikikaisha shimatsu* (History of the Kyoto Electric Company), 108. For 1917, see Teishinsho denkiyoku, *Denkijigyoyoran* (Statistical yearbook of Japanese electric utility industry).

Kyoto, however, could have become a regulator. In 1889, KEL submitted a proposal to the Kyoto Municipal Council that requested that the municipal hydroelectric station be leased to KEL. In return, the municipal government would hold the right to regulate tariffs, claim some income, and municipalize KEL under certain conditions. Had Kyoto accepted the proposal, there might have been a Japanese version of municipal franchise in the 1890s; however, the Kyoto Municipal Council voted against it.<sup>42</sup>

Japan became aware of municipal franchises after the turn of the century. In 1900 Kyoto dispatched the first Japanese municipal government delegation to Europe to study public administration. After returning home, the delegation, drawing evidence from Berlin, highlighted that ownership of public passageways was ambiguous in Japan, and recommended municipal regulation through franchise-based on rights of way.<sup>43</sup> The Kyoto Municipal Council voted for the municipal takeover of KEL in 1902.<sup>44</sup> However, this was on the eve of the Russo-Japanese War, so the plan failed because the city was unable to raise municipal bonds.

42. Kyotoshi, *Biwako*, 654–655.

43. Kyotoshi sanjikai, *Berurinshi gyosei no kimou to genzai* (Report on public administration in the city of Berlin), 1–5.

44. *Kyoto shikai gijiroku*, January 18 and April 11, 1902.

It was not only the war that made adoption of municipal franchise difficult. In 1903 Osaka's municipal government initiated negotiations with Osaka Electric Light (OEL) with the hope of reaching a franchise. The Osaka municipal government demanded 5 percent of OEL's gross profit; the right to approve OEL's tariff, capital increase, bond issuance; and the right to municipalize OEL after the franchise's expiration. In exchange, OEL would be given monopolistic right to use public passageways in the city.<sup>45</sup> However, the demands provoked fierce debates among businessmen, senators, lawyers, and scholars. The Japan Electric Association and OEL declared themselves against the franchise.<sup>46</sup> Some jurisprudence professors held that the demands were illegal.<sup>47</sup> After protracted negotiations, Osaka and the OEL finally agreed to a franchise in 1906.<sup>48</sup> Other big cities signed franchises with urban utilities: Nagoya in 1908, Kyoto in 1911, Tokyo in 1912, and Kobe in 1914.

However, the franchise in Kyoto was short-lived. The city reached a franchise with the newly established utility Kyoto Electric Company (KEC) in 1911. A year later, KEL acquired KEC.<sup>49</sup> Surprisingly, the municipal government did not continue the franchise, partly because, by that time, KMEW had decided not to regulate tariffs but instead to initiate a tariff war with KEL.

Despite its short duration, the contents of Kyoto's franchise were typical in Japan.<sup>50</sup> Although it did not include a monopoly on the use of roads, it detailed compensation and purchase conditions. Road monopoly was undesirable because, as with the case of Kyoto, some cities were already operating, or were planning to open, municipal

45. For the negotiation process between Osaka's municipal government and OEL, see Umemoto, *Senzen nihonshihonshugi*, 30–36. See also Hagiwara, *Osaka dento*, 465–475.

46. The Japan Electric Association was founded in 1892 as the industrial association of electric utilities. It organized exhibitions, negotiated conflicts, and oversaw political lobbying. It should not be confused with the Institute of Electric Engineers of Japan, which was an academic association. For the history and activities of the Japan Electric Association, see Denkiyokai, *Denkiyokai junenshi* (Ten years of Japan Electric Association).

47. For the attitude of the Japan Electric Association and legal authorities, see Tokyo shisei chousakai, *Denkijigyo hoshokeiyaku* (Report on franchise in electric utility), 11–12.

48. The franchise between Osaka City and OEL is the second oldest in the history of Japanese electrification but it was influential because it set the model for other large cities. The first franchise was signed in 1905 between OEL and Sesebo, a small city in western Japan.

49. For the history of Kyoto Electric Company, see Kyotodenki, *Kyotodenki kabushikikaisha shimatsu* (History of the Kyoto Electric Company).

50. For details on the franchise between KEC and the Kyoto municipal government, see *ibid.* For the franchises in other cities, see Tokyo shisei chousakai, *Denkijigyo hoshokeiyaku*.

utilities. While most Japanese municipal governments claimed a percentage of gross profit from the private utilities so as to increase public revenue, not all municipal franchises mentioned price regulation. In general, Japanese municipal franchises were more interested in compensation rather than in regulation. The literal translation for *hoshokei-yaku*, the Japanese term for franchise, is compensation contract.

The Japanese municipal franchise was born out of a centralized regulation structure. After the 1910s, contradictions in centralized concessions and decentralized franchises usually led to conflicts between the Ministry of Communication and municipal governments, especially in matters of municipal takeovers.<sup>51</sup> The national government had even more control if a municipal franchise conflicted with policies of the Ministry of Communication. Overall, the municipal franchise was a weak regulation model.

### Competition

In 1906, about a decade after the gentlemen's agreement, KMEW created a new strategy: sell light and power to all citizens.<sup>52</sup> KMEW's system expansion began in 1908, and by the completion of the new power stations and substations in 1914, its capacity had increased from 1,800 kilowatts to 6,400 kilowatts.<sup>53</sup> KMEW began retailing electric lighting in 1912, and with that KEL's monopoly in electric light was broken.

The new strategy was not only a response to the backward state of Kyoto's electrification and a farewell to the gentlemen's agreement but was also in accordance to the Ministry of Communication's policy. At that time, the Ministry was granting concessions of the same areas to multiple utilities so as to encourage competition and to promote electrification.<sup>54</sup> The ministry divided concessions into the light market and the power market. In the case of Kyoto, the ministry granted an electric light concession to KMEW in 1906, and another electric light concession of the same supply area to the aforementioned Kyoto Electric Company (KEC). In 1910, three utilities (KEL, KMEW, and KEC) in Kyoto held electric light concessions and two (KEL and

51. For example, when Nagoya sought to municipalize Nagoya Electric Light when the franchise expired in 1932, the Ministry of Communication administratively forbade the takeover. See Kikkawa, *Nihon denryokugyo hatten no dainamizumu*, 158.

52. *Kyoto shikai gijiroku*, March 9, 1907.

53. *Ibid.*, March 18 and November 28, 1906; August 28, 1909; September 23 and November 24, 1910. See also Kyotoshi, *Shisei no keisei*, 203–216.

54. For details on the Ministry of Communication's policy, see Kogakkai, *Meiji kogyoshi denkihen* (Industrial history in the Meiji period: Electricity), 492–496.

KMEW) held electric power concessions. Kyoto represents a typical case of competition under the central government's policy.

Retained earnings and municipal debts financed KMEW's expansion. Mitsui Bank offered a short-term debt, with a limit of 100,000 yen per month. Twice, once in 1909 and again in 1911, a French consortium, via Mitsui Bank's foreign branch, underwrote Kyoto's municipal bond. The total foreign debt of 50,000,000 yen was to be redeemed in 1919. Kyoto chose Paris so as to avoid competition with Tokyo's and Osaka's municipal bonds, which were issued in London.<sup>55</sup> With entrance into the electric light market, costs for KMEW's distribution systems rose tremendously. The distribution costs in 1912 totaled 155,000 yen, three times the original 50,000 yen estimate.<sup>56</sup> In 1914 Kyoto issued a 1.2 million yen domestic bond, which included 450,000 yen for the distribution system.

The surging distribution costs were largely caused by KMEW's policies on low tariffs and nondiscriminatory expansion. Many of KMEW's new electric light applicants came from thinly populated city areas. The former electric light monopoly, KEL, had refused to build distribution systems in these areas for cost reasons; after all, it took 1,000 yen to extend distribution to a remote part of the city for what would amount to only one or two bulbs. These areas thus had remained without electrification. This scenario played out frequently and put the social responsibility of private utilities in question.<sup>57</sup> However, KMEW, wanting to provide electricity to all citizens, did not take into account the location of consumers, and thus bore huge costs to build distribution systems to remote areas. Additionally, KMEW's prices were cheaper than KEL's. For example, KMEW charged a 20-watt bulb for only 0.45 yen, while KEL charged it at 1.2 yen. KMEW's prices were akin to subsidies for citizens who lived in thinly populated areas.<sup>58</sup>

To reduce distribution costs, the municipal council wanted KMEW and KEL to make common use of electric poles. If KEL and KMEW could share the existing poles, then the municipal government would

55. Ito, *Kindai kyoto no kaizo* (Modernization of Kyoto), 110–118; *Kyoto shikai gijiroku*, July 28, 1908. For details of foreign municipal bonds, see Yamaichi shoken, *Yamaichi shokenshi* (History of Yamaichi Securities Company), 87.

56. *Kyoto shikai gijiroku*, January 13, 1913. In 1912 KMEW's gross profit was 107,162 yen, and 156,499 in 1913.

57. For example, in 1931, the average electric light price in cities was 0.192 yen/kilowatt and 0.974 yen/kilowatt in rural areas. See Nourinsho noumukyoku, *Honpo Nosondenkanikansuru chosagaiyo* (Summary report on rural electrification in Japan), 24.

58. For KMEW's policies and cost calculations, see *Kyoto shikai gijiroku*, September 25, 1913 and November 25, 1914.

not have the expenditure of building new poles that ran parallel to KEL's old ones. However, KEL, having no incentive to cooperate with a competitor, rejected the suggestion.<sup>59</sup>

The expansion of KMEW's distribution system and its extremely low tariff significantly improved the rate of residential electrification. KMEW user numbers exploded, from 1,335 households in 1912, to 14,547 households in 1913, and to 38,887 households in 1915. Conversely, KEL users increased from 61,494 households in 1912, to 78,797 households in 1913, but then stagnation followed: from 1914 to 1915, there was a meager increase of only 65 households. In 1914, 80 percent of KMEW's new customers were KEL's former customers.<sup>60</sup> Thanks to KMEW's expansion, residents in every corner of Kyoto were connected to electricity by 1915 (Table 3). It was the first Japanese city that reached 100 percent residential electrification, and it remained the most electrified Japanese city in terms of residential households in the late 1910s (see Table 2).

### Demarcation

In the Japanese context, residential electrification rates increased rapidly in the 1910s, largely due to the competition between electric utilities. However, in electricity, competition in the same territory meant rate wars, which usually drove prices to a level that covered only operating costs, not also fixed capital costs.<sup>61</sup> Kyoto's experience was no exception. Starting in 1914, KMEW began losing money; and between 1911 and 1915, KEL's stock price fell from about 100 yen to only about 50 yen. Both would have been close to bankruptcy if their competition had continued and if the national government had not intervened. The Ministry of Communication eventually switched policy in response to improved residential electrification: overlapping concessions in lighting were frozen.

In 1914, the ministry sent Kyoto an administrative order demanding a demarcation, which KEL welcomed but divided the Kyoto Municipal Council. The council worried that a forced demarcation violated the municipal government's self-governance, and that some citizens would be deprived of their rights to use the inexpensive service provided by the municipal electric works. The municipal council voted

59. *Ibid.*, January 13, 1913; November 25, 1914; February 22 and February 23, 1915; Ito, *Kindai kyoto no kaizo*, 123–124.

60. For the statistics of KMEW, see Kyotoshi denkiyoku, *Kyoto shiei*, 602–603. For the statistics of KEL, see Kyoto dento, *Kyoto dento*, appendix “keiseiseiki ruinen hikakuhyo” (Tables on business performance in the previous years).

61. Neufeld, *Selling Power*, 48–49.



Table 3 Residential electrification statistics of Kyoto, from 1890 to 1915

Year	Total number of bulbs	Percentage of electrified households
1890	1,188	0.6%
1895	8,900	4.6%
1900	15,510	7.4%
1905	20,632	8.4%
1910	48,500	17.3%
1915	296,264	100%

Source: Kyoto furitsu sogo shiryokan, *Kyotofu tokei shiryō shū* (Historical statistics of Kyoto Prefecture), 297.

for demarcation only after it became clear that if the competition continued, Kyoto would be unable to pay its foreign and domestic debts.<sup>62</sup> Nevertheless, thousands of citizens demonstrated against the decision. In April 1915 KMEW and KEL signed a demarcation agreement.<sup>63</sup> The overlapping distribution systems constructed by KMEW were dismantled before 1918.<sup>64</sup>

## Conclusion

Through the case study of Kyoto, this article discussed aspects of business–government relations in Japan’s electrification. It also compared the experience of Kyoto with that of other large Japanese cities.

From the point of ownership, Kyoto became an entrepreneur because it interpreted electric power as a symbol of modernization. Income incentives and the check on private monopoly seemed subsidiary concerns. However, at the turn of the twentieth century, Japanese cities discovered the financial advantage of municipal ownership and began operating government-owned utilities.

62. For details on debates in the municipal council, see *Kyoto shikai gijiroku*, October 7, November 5, November 25, November 26, December 16, and December 28, 1914; February 7, February 9, February 23, March 2, and March 3, 1915. For the revenue, dividend rate, and net profit of the KMEW, see *Kyotoshi denkiyoku, Kyoto shiei*, 706–707.

63. For details on the demarcation agreement, see *Kyoto shikai gijiroku*, April 17, 1915.

64. *Kyotoshi denkiyoku, Kyoto shiei*, 597–598. The demarcation agreement was in effect until 1942. In that year, the Japanese central government, after nationalized power generation in 1939, merged power distribution utilities into nine regional blocks. Under this order, KEL and KMEW dissolved themselves. After the World War II, the Allied powers, which occupied Japan from 1945–1951, reorganized Japanese electric utilities into nine monopolistic and vertically integrated firms. These firms were privately owned. In postwar Japan, except in the city of Kanazawa, municipal electric works were nonexistent. For details of the wartime nationalization and postwar reorganization, see Kikkawa, *Nihon denryokugyo hatten no daiamizumu*, 167–208.

From the point of regulation, Kyoto's experience shows that regulation was a historical process and that regulation models were not universal. Municipal franchises were imported from Western countries but had to be adapted to Japan's legal and political contexts. Additionally, because the national government centralized regulation in the early stages of electrification, the municipal franchise was a weak regulation model.

Kyoto's experience also indicates that electricity becoming a monopoly depended on the regulator and the utility, with both understanding the cost structure of the industry. This shows that one must pay attention to the historical context of natural monopoly.

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