Rural History (2025), 1–17
doi:10.1017/S0956793325000081

CAMBRIDGE UNIVERSITY PRESS

RESEARCH ARTICLE

Japan's rural electrification before the mid-1930s: Private-owned utility, local community, and policy

Chenxiao Li

Shanghai Academy of Social Sciences, Shanghai, China
Email: lcx02@sass.org.cn

Abstract

The paper provides a narrative history of Japan's rural electrification before the mid 1930s, focusing on the interplay among private-owned utilities, local communities, and policy. In joining the revisionist historiography on rural electrification, the paper highlights the important role played by private-owned utilities in electrifying the countryside before the 1930s. Although extending electricity systems to the countryside was uneconomical compared with densely populated cities, the rural market provided business opportunities when private-owned utilities sought to balance load factors and sell surplus power generation capacity. However, as consequence of profit-seeking, the rural communities were charged higher price for electricity, faced inferior supply conditions, and disputed with private-owned utilities over how to electrify the villages. Some communities tried public ownership, but the Japanese government was not always favourable to local initiatives out of ideology and national system considerations. The noninterventionist policy incited social discontent that aired itself in the late 1920s in tariff disputes and, with the onset of the Great Depression, pushed the government to change its policy to subsidisation and eventually to nationalisation. By contextualising rural electrification in Japan's business, ideological, and regulatory context, this paper re-evaluates private-owned utilities, but also points out its limitation in electrifying the countryside.

Introduction

In Japan, electric illumination with central stations started in 1887 in Tokyo, and the use of central station power for factories started in Kyoto in 1891. Rural electrification started in June 1902, when electrical irrigation first appeared in Yamagata Prefecture. As historian Francks (2006, p. 204) put it, rural electrification started in Japan relatively early by international standards. Japan had been industrialising rapidly since the Meiji Restoration, but most Japanese people still lived in rural areas before the Second World War. Although urbanisation proceeded in large cities such as Tokyo and Osaka, 54 percent of the Japanese population lived in towns and villages with residents below 10,000 in 1930 (calculated from Sōrifu tōkeikyoku 1972, pp. 16–17). In the same year, 48 percent of Japanese labour was still employed in the agricultural sector (Fukao et al. 2017, p. 286). Rural electrification was thus important for the majority of the Japanese population before the mid 1930s. As a salient feature of Japan, the electric power industry has been dominated by private-owned utilities until this day, except for a short interval of nationalisation from 1939 to 1951 (Kikkawa 2006). For a country like Japan, how were the rural communities electrified when the electric power industry was dominated by private-owned utilities? What were the contributions and limitations of private-owned utilities' economic rationale? How did policy contextualise Japan's rural electrification?

Bearing these questions in mind, the paper traces the history of Japan's rural electrification before the mid 1930s using a narrative approach and an analytical framework that focuses on the interplay among private-owned utility, local community, and policy. The analytical framework is adapted from Hirsh's (2018, 2022) subsystem actor framework, which is based on Hughes's (1983) socio-technical system model and tailored by Hirsh to explore the history of American rural electrification. As will be explained in the next section, many similarities between Japan's and the United States' electrification, such as dominance of private-owned utilities and non-interventionist government policy, make the framework viable for the Japanese case. The paper argues that Japan's private-owned utilities did make great contribution for rural electrification, despite many limitations of profit-seeking that led to discount from the rural communities. The Japanese case presented in the paper joins the revisionist historiography in the re-evaluation of private-owned utilities' role in electrifying the countryside at a time when the government was still reluctant in direct intervention.

The paper is structured as follows. In the next section, we give a brief review of recent literature, lay out our analytical framework, and explain our methodology. Then, the main text starts from an overview, which uses comparative statistics and qualitative descriptions to show that in average, most of rural dwellings in Japan had been on the grid, although there were insufficiencies such as illumination conditions, rural–urban gap, and agricultural power. After the overview, the paper uses three separate sections to examine the interplay between private utility, rural community, and policy, with each section focusing on one of the subsystem actors. Finally, the argument presented through these sections will be summarised in the conclusion, which also discusses the paper's implication.

Literature review, analytical framework, and methodology

Electrification and related historical studies start with urban light and power. Hughes's (1983) classical *Networks of Power* compared technology-politics relations in electrification in Germany, Britain, and the United States, focusing on Berlin, London, New York, and regional grid systems. Rural electrification did not attract Hughes's attention, largely because the scope of Hughes's analysis ended in the 1930s. Kline (2000) and Phillips (2007) examined how American rural households adopted electricity, which served as a novel form of modernity together with telephone, radio, and automobile. Glaser (2009) offered another perspective, showing that rural electrification did not necessarily further the creation of a dominant national culture. A number of historical case studies on American rural electrification have appeared in recent decades, such as Needham (2015) on the Southwest, Hirt (2012) on the Northwest, and Carter on the Modern South (2019).

Recent studies on the history of rural electrification continue to expand the thematic width of the field. Hirsh (2018; 2022) challenged the traditional narrative that glorified the Rural Electrification Administration (REA) and instead refocused on the significant role of private-owned utilities. Plutshack and Merck (2024) studied the gender history of the REA. Navickas (2019) examined the British grid and rural space from an environmental history perspective. Hasenöhrl (2018) offered global insight by examining rural electrification in the British Empire. Furthermore, research is no longer limited to the Anglo-American context; for example, Garrués-Irurzun and Iriarte-Goñi (2023) examined Spanish rural electrification, and Brassley et al.'s edited volume (2017) on the British case includes chapters comparing Sweden and Canada (Sandwell 2017; Martiin 2017). The history of rural electrification is also drawing interdisciplinary attention from anthropology and human geography (for example, Harrison 2016; Cross 2019).

In Japan, historians in the past decades have paid more attention to urban electrification and the history of national grids than to rural electrification (for example, Kikkawa, 2004; Kikkawa 2006). Nishino's (2020) recent monograph, with case studies of rural electric cooperatives and

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

village-owned utilities, marks a step towards filling this research gap. By focusing on rural cooperatives and village-owned utilities rather than on mammoth private-owned utilities, Nishino's narrative has similarity with the stories told by many American historians (for example, Glaser 2009; Needham 2015) in interpreting private-owned utilities' economic rationale as a hindrance to rural electrification before the New Deal. Moreover, bearing in mind the Fukushima nuclear accident of 2011, Nishino (2020; Nishino 2018) shared Shin's (2025) practical concern over the imbalanced development and the central–peripheral relationship between Tokyo and rural regions such as Fukushima.

In contrast to Nishino (2020), this paper tries to refocus on the role of private-owned utilities in the history of Japan's rural electrification in the context of the interplay among private-owned utilities, local communities, and policy before the mid 1930s. The paper's analytical perspective is adapted from Hirsh (2018, 2022)'s subsystem actor framework. Whereas Hirsh uses the framework to present a revisionist historiography of American rural electrification, this paper adapts the framework to the Japanese case to highlight the role played by private-owned utilities.

The adaptation of Hirsh's framework to Japan is justified by some similarities in American and Japanese electrification. First, the electric power industry in both Japan and the United States was dominated by private-owned utilities. In the United States, about 80 percent of electricity was generated by private-owned holding companies in 1924 (Neufeld 2016, p. 114). Except for a short period of wartime nationalisation (1939–51), private ownership dominated Japan's electric power industry to the extent that Samuels (1987, p. 135) ranked Japan's private utilities as among the largest privately owned and operated systems in the world. Second, and related to the ownership structure, before the 1930s, in both Japan and the United States, electric utilities did not pursue money-losing business, nor did many people think they should (for the American case, see Hirsh 2022, p. 5; for Japan, see Nishino 2020, p. 292). Third, in both countries, the government authorities adopted noninterventionist attitudes towards rural electrification until the mid-1930s. In the United States, although private-owned utilities made considerable efforts to create mutually beneficial schemes for rural electrification, the majority of the countryside did not become electrified until the launching of REA in 1935 (Tobey 1996). A similar story can be told about Japan. As historian Uchikawa (2020) argues, it was not until 1935 that the Japanese government abandoned its non-interventionist stance regarding rural electrification. For these reasons, the subsystem actor framework can be adapted as an analytical framework to trace the history of Japan's rural electrification.

Hirsh (2022, pp. 8–10) modifies Hughes's (1983) framework by viewing rural electrification as a subsystem in a large socio-technical system. The socio-technical system, according to Hughes's classical understanding, is composed of both technological artefacts (such as power plants, transformers, and wires) and non-technological factors (such as cultural, economic, financial, and regulatory). History of electrification is, therefore, situated in a broad context of interplay between the factors. Staring from the socio-technical system framework, Hirsh further identifies three sets of subsystem actors to construct a revisionist perspective to analyse American rural electrification: (1) utility managers, (2) farmers, and (3) professors of agricultural engineering at land-grant colleges. This paper borrows the subsystem actor framework but replaces (3) with government policy to better explain the Japanese case. However, it bears noting that in adopting the socio-technical system model, Hirsh's framework, as well as this paper's, shares taints of Hughes's technological determinism, which has been criticised in recent scholarship (for example, Chappells and Shin 2018; Moss, 2022; Nye 2023). In addition, the frameworks, by focusing on the supply side, does not give much consideration to user, gender and race (for example, Jacome 2023; Plutshack and Merck 2024; Powell 2018).

We use narrative as our methodology. Narrative as an approach for historical study, according to Luarsabishvili (2023, p. 57), can be defined as a chronological sequence of historical events and has a definite plot. For this paper, we will present our argument in a coherent narrative that threads statistics, descriptive case studies, international comparisons, and critical analysis of

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

Table 1. Comparative statistics of electrification, Japan and some western countries

Country	KWh per capita	KWh per km^2	Percentage of population connected to grid (year)
Britain	559	107,800	44 percent (1933)
Canada	2,314	2,700	59 percent (1931)
Germany	623	88,800	85 percent (1935)
Japan	393	71,500	89 percent (1935)
Sweden	1,200	16,700	85 percent (1932)
Switzerland	1,454	147,700	99 percent (1933)
USA	887	14,590	68 percent (1935)

Note: Data are of the year 1936, except for the percentage of population connected to grid.
Source: Data for Canada from Sandwell 2017, p. 183; for other countries, from Denkigakkai (1939), p. 496 and p. 513.

source. The plot we use follows the subsystem actor framework we explained above, focusing on the interplay among private utility, rural community, and policy. Source materials for the paper come from newspapers, government reports, and secondary publications. The paper draws upon many contemporary newspapers, especially *Asahi Shinbun* (founded in 1879 and still the most circulated Japanese newspaper today) and *Chūgai Shōgyō Shinpō* (founded in 1876 and the predecessor of Japan's most authoritative business gazette *Nikkei Shinbun*). The government reports used in the paper are mainly the Ministry of Agriculture (Nōrinshō)'s 1933 survey of Japanese rural electrification (Nōrinshō nōmukyoku 1933), which has a wide range of national statistics and first-hand case reports. The paper also uses publications from private-owned utilities, the Institute of Electrical Engineers of Japan (Denkigakkai 1939), and the Rural Electrification Association (Nōji denka kyōkai,1940).

Japan's rural electrification: a comparative overview

Japan's electrification, as part of the country's uptake of western technologies, was 'striking' as historian Chatterjee (2020) puts it. Japan's earliest electric utility, Tokyo Electric Light, was set up in 1883, and began electric illumination supply in 1887, at approximately the same time as electric utilities in Britain, Germany, and the USA. By 1914, Japan had constructed a power transmission system from Lake Inawashiro, Fukushima, to Tokyo at 115k volts, which was the highest transmission voltage in the world at that time except for the United States (Hausman et al. 2008, pp. 20–21; also compare Shin 2025, pp. 44–45), reflecting Japan's technological advance in electrical engineering. By the 1930s, the percentage of electrified Japanese households was more than 90, surpassed that of the United States (68 percent), Germany (85 percent), and Britain (44 percent) (for comparative statistics, see Table 1). Contemporaries regarded Japan's average electrification as a source of national pride. The business gazette *Chūgai Shōgyō Shinpō* reported in 1925 that electrification had made Japan one of the most 'civilised' countries in the world.[1] However, as Shin (2019, p. 103) noted, the average statistics of the electrification rate are an imperfect measure. In this respect, we may consider the following points.

First, the average data obscures conditions about how electricity is consumed. For example, a mid- 1930s Japanese user consumed less electricity than an American, British, or German user, even though there was more percentage of Japanese households connected to the grid (Table 1). An explanation may be that at the time, an average Japanese household used electricity mainly for illumination. Moreover, regarding the rural–urban gap, the average rural electricity consumption

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

in Japan was 27 percent lower than the national average (Nōrinshō nōmukyoku 1933, p. 7), indicating that rural residents used far less electricity than did urban residents.

Second, by the end of the 1930s, an average electrified Japanese household had a few lamps, usually sockets dangling from the ceiling, of little more than 20 watts, which was usually dim (Shin 2019, p. 104). Notably, there is also an urban-rural gap in the number of 'a few lamps'. In 1931, a rural Japanese household had, on average, 1.8 electric lamps, whereas an urban household had 3.2 lamps (Nōrinshō nōmukyoku 1933, pp. 8–10). The geographical distribution of electric lamps was concentrated in large cities. For example, the total number of electric lamps in Fukushima Prefecture was only 1 percent that in Tokyo in the beginning of the 1930s (Nōji denka kyōkai 1940, pp. 210–11). However, Fukushima's hydropower supplied more than 43 percent of Tokyo's electricity in 1929 (Shin 2025, p. 45). Whereas rural Japan provided hydropower resources for the big cities, there was huge gap between urban–rural electricity consumption.

Third, in rural Japan, four times more electricity was consumed for illumination than for non-illumination purposes in 1931(Nōrinshō nōmukyoku 1933, p. 24). This contrast indicates that the use of electricity for agricultural work remained very limited in the countryside. However, this does not nullify the fact that the majority of Japanese villages were connected to electricity, nor should the lower electricity consumption for non-illumination purposes obscure Japan's progress in electrifying agricultural works in the 1920s. The number of electric motors used in agriculture increased from 683 in 1920 to 28,306 in 1931 (Francks 2006, p. 224). Most of the electric motors used in agriculture had small power output, with an average of 2.8 KW per machine in 1928 (Nōrinshō nōmukyoku 1928, p. 2–3). Agriculture remained labour intensive, although most villages had been connected to electric light by the 1930s.

Even though average statistics of the electrification (Table 1) may be an imperfect measure, it remains true that Japan' electrification by the 1930s, including rural electrification, may be considered successful compared with many western countries. In Canada, 59 percent of households received central station electricity in 1931, in contrast to only 10 percent of farm dwellings (Sandwell 2017, p. 186). In the United States, 68 percent of all households used electricity in 1935, but fewer than 5 percent of farms in the South were electrified (Glaser 2009, p. 16). In Britain, 44 percent households were on the grid, but only 7 percent of farms were connected to the grid, and the majority of the rural population was not linked to a stable electricity supply until sometime between the 1950s and the 1970s (Brassley et al. 2017, p. 6). It is unsurprising that in 1937, Owata Teiji, a staff member at Japan's Ministry of Communication (Teishinshō), reported that there were nearly no Japanese villages without electric illumination, although he recognised that Japan's per capita electricity consumption lagged far behind that of Norway and Canada (Teishinshō denkikyoku 1937, p. 55). Overall, despite its many shortcomings, Japan's electrification proceeded rapidly, and the rural use of electricity was relatively widespread in international comparisons. To explain how rural Japan was electrified, we shall examine the interplay between private-owned utility, rural community, and policy.

Private-owned utilities: the rural market as a challenge and an opportunity

As a salient feature from a comparative perspective, Japan's electric power industry was dominated by private-owned utilities. In the USA, there had been already 1,737 public-owned utilities in 1912, even though private-owned utilities generated far more electric power (Kwoka 1996, p. 5). However, Japan had only 2 public-owned electric utilities before 1907, and only 15 percent electric utilities were public-owned in 1930 (calculated from Kikkawa 2004, p. 107). As another important contextual factor, the Japanese government did not set price regulation in electricity until the beginning of the 1930s. As long as the industry was dominated by private-ownership, the utilities adhered to economic logic in regard to electrification. For the profit-seeking electric utilities, rural electrification was both a challenge and an opportunity.

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

In economic rationale of the private-owned utilities, the countryside was an unattractive market. First, rural electrification requires enormous investment in distribution lines. For the cities, high population density constituted the byword of nascent electricity business because the corresponding area could offer services with a relatively small investment. In densely populated cities, a wire can serve many households, but in thinly populated villages, many wires serve one household. In 1929, the business gazette *Chūgai Shōgyō Shinpō* reported that the cost breakdown for a rural electricity system was approximately 15 percent for generators, 15 percent for transformers, and 70 percent for distribution.[2] Therefore, as *Chūgai Shōgyō Shinpō* concluded, the greatest obstacle to rural electrification was the cost of distribution.

Second, the seasonal fluctuation of agricultural work increases the cost of rural electricity. Agriculture is seasonal. Rice, for example, is planted in May and harvested in September. In the summer months, one must control water through irrigation and drainage. Electrical pumps for these purposes are used intensively and then left idle for the remainder of the year, but the cost of extending the system to farms must be recovered throughout the year.[3] In 1931, for example, Japan's agricultural power consumption stabilised at approximately 3.5 GWh (gigawatt-hours) from November to April, increased to 9.3 GWh in May, surged to approximately 19 GWh from June to August, and returned to 9.4 GWh in September (Nōrinshō nōmukyoku 1933, p. 70). As indicated by the technical calculation of the 'load factor', the more fully a system is utilised, the lower the idle capacity, the lower the unit cost of power generated, and the greater the return on investment (Hirsh 2022, p. 46). As Matsunaga Yasuzaemon, head of Japan's second largest electric utility Tōhō Electric Power, told *Tokyo Asahi Shinbun* in 1924, because of seasonal fluctuations in the use of agricultural power, rural electrification would not be economical, unless agricultural power could be connected to a large electricity system that diversified load by combining lighting, industrial power, traction, and agriculture.[4]

Third, the profitability of rural electrification is dependent upon scale. Using the case of paddy husking processes in rice, wheat, and soybean, *Osaka Asahi Shinbun* calculated in 1929 that electrification could not be economical unless crops from land at the scale of more than 73.5 acres could be processed together.[5] The newspaper did not mention that the average land size per rural household was approximately 2.6 acres in 1930 (calculated from Takeda 2019, p. 218). The large number of small cultivators was one of the obstacles before electrical powering of agriculture.

Although economic calculations may cause private-owned utilities' aversion towards rural electrification, there are also reasons that the countryside could be a potential market. We discuss the supply side above, but on the demand side, electricity is attractive for rural dwellings because it is less expensive than other illumination methods are. Luminous intensity, or the degree of brightness, is measured by a unit called candela. In the mid-1920s Japan, to sustain one candela for an hour, one had to spend 3.1 yen for Japanese-style candles, 0.12 yen for oil lamps, 0.03 yen for gas lamps, and 0.025 for tungsten lamps using electricity (Minami 1965, p. 10). Given that tungsten lamps are much less expensive than candles and oils are, it is unsurprising that, at the time, most Japanese households had been using electric illumination; only gas lamps offered a viable alternative. The Ministry of Agriculture also recognised the economies of electric lighting in a 1933 report, noting that even for remote villages not connected to central station electricity, electric illumination from isolated plants could be less costly than oil lamps were (Nōrinshō nōmukyoku 1933, pp. 115–16). Therefore, once initial investments in distribution could be made, electricity was appealing to the farmers on the demand side.

Back to the supply side, the countryside became a potential market for private-owned utilities in the 1920s when they realised that they built more power generation capacity for cities than urban residents and factories were able to buy. At the time, market competition between Japan's electric utilities centred on big cities and resulted in surplus power generation capacity. As early as 1924, the newspaper *Kokumin Shinbun* (founded in 1890) reported that 37 percent of northeast Japan's power generation capacity was not used because of over-competition. *Kokumin Shinbun* listed rural electrification as a viable solution.[6] At the beginning of the 1930s, approximately 30

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

percent of Japan's power generation capacity was estimated to be surplus (Denkijigyō saihenseishi kankō iinkai 1952, p. 56). Although rural Japan consumed less electricity than cities did, it accounted for 28 percent of Japan's electric lamps and 14 percent of Japan's total electricity demand according to a government survey in 1933 (Nōrinshō nōmukyoku 1933, p. 7). Therefore, there is little wonder that *Osaka Asahi Shinbun* reported in 1927 that Tokyo Electric Light, Japan's largest electric utility, took pains to sell surplus capacity in rural regions around Tokyo, such as Chiba and Ibaraki.[7] The private-owned utilities used the rhetoric of the public interest to glorify their rural investment. Tokyo Electric Light told *Osaka Asahi Shinbun* that the utility 'made a huge sacrifice' to promote electrification in the countryside in pursuit of the public interest.[8] Similarly, Chūgoku Gōdō Power, a utility in western Japan, boasted of improving distribution at the company's 'sacrifice' (Nōji denka kyōkai 1940, pp. 252–55).

Whereas some private-owned utilities address distribution costs at their own expense, others address the load factor problem with pricing. To borrow the American experience again, in the 1910s, California's private-owned utilities promoted rural electrification because they realised that the rural irrigation demand in the spring and summer complemented the urban demand in the fall and winter, thereby leading to better load factors for the whole system throughout the year (Hirsh 2022, pp. 104–105). Japan's private-owned utilities in the 1920s invented price schemes that encouraged the use of power for agriculture. In 1924, Tōhō Electric Power, Japan's second largest electric utility, invented a pricing system for powered irrigation that charged a lower price from May to September. Similar pricing was soon adopted by electric utilities in rural regions such as Kumamoto, Akita, and Hokkaido (Nōji denka kyōkai 1940, pp. 216–19). By the end of the 1930s, Japanese utilities had developed differentiated pricing schemes for insecticides, sericulture, tea, and fisheries to encourage electricity consumption in these agricultural branches. However, caution is warranted, as pricing strategies differed across utilities. The Ministry of Agriculture noted in 1933 that some utilities set prices that were beneficial for farmers, but there were also many that charged exorbitant prices (Nōrinshō nōmukyoku 1933, pp. 168–69). As will be discussed in the next section, on average, rural consumers at the time paid higher electricity prices than did urban consumers.

In marketing electricity to the countryside, private-owned utilities across Japan organised various sales campaigns targeting rural customers. In addition to typical pamphlets, home visits, expositions, and educational lectures, some utilities invented techniques such as monthly credit to finance the purchase of electrical machinery (Nōji denka kyōkai 1940, pp. 252–55). Even in remote regions such as Niigata Prefecture, the local utility Niigata Hydropower boasted the use of 'the latest promotion techniques' for rural electrification (Nōji denka kyōkai 1940, p. 236). In 1925, the newspaper *Ōsaka Mainichi Shinbun* reported that electrical civilisation has been brought to the countryside even in mountainous regions such as Yamanashi Prefecture.[9] Despite the rhetoric, it is undeniable that Japan's private-owned utilities contributed to rural electrification. In Nara Prefecture, for example, the Rural Electrification Association reported that owing to efforts by Tōhō Electric Power, distribution lines spanned the whole prefecture so that rural sale campaigns were no longer needed after 1930 (Nōji denka kyōkai 1940, pp. 252–55). The association does not mention that if so, that means the private-owned Tōhō Electric Power had extended its regional monopolistic supply to the Nara countryside.

The Rural Electrification Association (Nōji denka kyōkai) was launched in 1923. The list of its members in 1940 included mainly private-owned utilities, with no public-owned utilities membership and no utilities from Hokkaido (Nōji denka kyōkai 1940, pp. 327–28). Among the memberships were also electrical machinery manufacturers (such as Hitachi and Mitsubishi), a bank (the state-owned Nihon Kangyō Bank, which specialised in long-term finance), two ministerial representatives (one from the Ministry of Agriculture and the other from the Ministry of Communication), and research institutions ranging from Tokyo Imperial University to local laboratories. In the United States, private-owned utilities in pursuit of rural electrification organised research groups in the National Electric Light Association and conducted joint research

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

with engineers at land-grant universities (Hirsh 2022, pp. 95–96). In Japan, the Rural Electrification Association expended similar efforts. The association also organised expositions, lectures, and prizes and published books. The association's official journal, launched in January 1924, was touted by the association as the world's first journal devoted to rural electrification (Nōji denka kyōkai 1940, p. 340).

As such, private-owned utilities' profit-seeking motives may discourage investment in the countryside, but they also made the rural market attractive when the utilities had surplus capacity and wanted to improve load factors. However, despite the pricing strategies, sale campaigns, associations, and glorifying rhetoric of electric utilities, it is important to return to the data we discussed in the previous section: four times more electricity was used for illumination than for non-illumination purposes in 1931 in the Japanese countryside. Japan's rural electrification was uneven, with gaps across regions and between lighting and agriculture. At the beginning of the 1930s, contemporary observers noted the limits of Japanese rural electrification. In 1930, the business gazette *Chūgai Shōgyō Shinpō* pointed out that the profit-seeking purpose of rural electrification in recent years, namely, that of selling surplus capacity, did not always result in good supply conditions and reasonable prices for farmers.[10] *Chūgai Shōgyō Shinpō* recognised that Japan had successfully electrified rural dwellings but still had a long way to go to power agriculture, and for that purpose, two alternative solutions were suggested: an isolated plant or a village-owned utility. The Ministry of Agriculture's report in 1933 also noted that in many cases, public-owned utilities contributed more to rural electrification than private-owned utilities did (Nōrinshō nōmukyoku 1933, p. 125).

Local communities: the limits of self-reliance

Despite the many efforts of private-owned utilities in electrifying rural Japan, electricity was sold as a profit-seeking business, not as a donation. In essence, the pricing schemes, sales campaigns, and Rural Electrification Association's activities in the 1920s can be positioned against the background of private-owned utilities' profit-seeking motivation to sell surplus capacity, to balance load factor, and to extend monopolistic supply to the villages. As a matter of fact, electricity tariffs were higher in rural areas. In 1931, a rural household paid 0.192 yen/kWh for electric light (Nōrinshō nōmukyoku 1933, p. 24), whereas the national average was 0.097 yen/kWh (calculated from Minami 1965, p. 222); for industry-oriented electric power (including agriculture), the average price for rural areas was 0.053 yen/kWh, whereas the national average was 0.037 yen/kWh. The price discrepancy can be explained by the higher cost of distribution to the countryside, the price of which had to be paid. However, for farmers, the economic logic might be understood as greediness, inequality, and discrimination. Given that nearly 90 percent of households nationwide were connected to electricity, it was a daily experience for rural communities that they had to pay more than urban people for the same kilowatt hour.

Furthermore, private-owned utilities and the communities they were to serve usually argued over who should pay what proportion of the distribution cost. Some private-owned utilities boasted of their 'sacrifice' in building rural lines, but in many cases that belonged to rhetoric. The initial cost of the electricity system often became a financial burden for village communities. For example, in the early 1930s, Kitayama Village in Saga Prefecture of Kyūshū Island, which had 584 households, requested the local electric utility to extend service to the village. The electric utility agreed that the village should pay 33,866 yen for the construction of 500 electric poles, that is, approximately 60 yen per villager. For reference, Japan's average agricultural income per year was 153 yen in 1930 and declined to 131 yen in 1935 because of the Great Depression (Minami 2008, p. 11). Kitayama Village could not afford the cost and eventually built an isolated hydropower station by itself (for the Kitayama case as well a handful of others, see Nōrinshō nōmukyoku 1933, pp. 73–91).

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

In addition to the mismatch between the economic rationale of private-owned utilities and the affordability for villagers, there is an aspect of regulation that hindered rural electrification. The Ministry of Communication, which had regulated electric utilities since the 1890s, withheld authority over franchises and used the authority selectively, making Japan's electricity market a dual structure composing of both free competition and regional monopoly. For cities such as Tokyo, Osaka, and Kyoto, the Ministry of Communication granted franchises to many utilities at the same time to encourage market competition, whereas other regions usually witnessed a monopolistic franchise (see, for example, Nishino 2018, p. 271 and pp. 274–78 for Tokyo and its suburbs). Most rural regions belonged to the latter case. If a local community wanted to be electrified, it had two choices: negotiate with the monopolistic utility of the region or build an electricity system by itself. The negotiations with private-owned utilities, as in our previous case from Kitayam Village, took time and disadvantaged small, remote, poor villages. Moreover, some villages located in remote mountains or on isolated islands were not even included in any utility supply area. If they could not afford to build a power station by themselves, then they had no chance of being electrified.

The unequal relationship between the local communities and the monopolistic utilities, in other words, between demand and supply, was noted by contemporary observers. As early as 1927, the business gazette *Chūgai Shōgyō Shinpō* noted a trap behind private-owned utilities' strategies of selling surplus capacity to the rural market: surplus capacity was temporal, but the imbalanced power structure governing supply conditions and pricing were long lasting.[11] In 1930, *Chūgai Shōgyō Shinpō* further commented that the unequal relationship between villages and monopolistic utilities was the fundamental reason behind the high initial cost borne by farmers.[12]

As an alternative to private-owned utility, the benefit of public ownership was widely recognised by the 1930s. In 1935, *Osaka Asahi Shinbun* reported that private-owned utilities charged a 1.7 times higher price for electric power and a 1.2 times higher price for electric light compared with public-ownership.[13] *Osaka Asahi Shinbun* also commented that the gap had been increasing in recent years. In a report from 1933, the Ministry of Agriculture noted that private-owned utilities would reduce their tariffs if a rural cooperative in the neighbourhood opened its own electricity supply since the latter usually offered lower price (Nōrinshō nōmukyoku 1933, p. 147). The Ministry of Agriculture also reported that although public-owned utilities were small in size compared with private-owned utilities, they contributed more to rural electrification (Nōrinshō nōmukyoku 1933, p. 125). Naturally, the villages awaiting electrification considered public-owned utilities as an alternative solution.

Regarding how to electrify rural Japan and by whom, the Ministry of Communication and the Ministry of Agriculture had different attitudes. The terms 'the Japanese government' and 'government policy' sometimes obscure the discrepancies between the ministries. Since the 1920s, the Ministry of Agriculture had favoured small, isolated plants on the basis of self-reliance, whereas Ministry of Communication believed that Japan's electricity system must not be balkanised into small systems. Whereas Ministry of Agriculture looked at rural electrification from the standpoint of the local communities, the Ministry of Communication's rationale took Japan's national system as a whole. It is reasonable and understandable that from an economical-technical viewpoint, the electricity supply systems of the Japanese archipelago needed to coordinate with each other, with power generation being concentrated in a few of the most effective power plants and with high-voltage systems transmitting power to consumption centres, rather than with each prefecture, city, or village having their own split, small, parochial system (Dengyō jidaisha 1934, p. 43). In reality, the economical-technical necessity of national system justified the status-quo, namely, the existence of mammoth private-owned utilities rather than small public-owned ones.

The Ministry of Communication had a long history of saying no to local initiatives. As early as 1912, a village in Nagano Prefecture called Akao decided to launch the village's own electric utility.

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

However, the Ministry of Communication vetoed that the decision. Japan's electricity regulation was centralised, and since 1891, the creation of electric utilities needed to be first approved by the Ministry of Communication. Akao village revolted against the decision, causing a dispute involving thousands of people (Shirakisawa 1994, p. 20). In the late 1920s, a number of Japanese local governments (prefecture, cities, towns, and villages) in search of local solutions devised plans to launch their own electric utilities, including Aomori Prefecture, Shizuoka Prefecture, Kyoto city, Nagoya city, Kumamoto city, and others. However, none of these public-owned utility initiatives was approved by the Ministry of Communication except for that of the remote prefecture of Aomori.

Moreover, whether a public-owned utility could be launched depended upon knowledge and finance. Ministry of Agriculture's survey in 1933 reported that some farmer did not know that electrical machines should avoid water and wetness. Some others were persuaded by machine brokers to buy electrical motors that generated more energy than needed, wasting money and power generation capacity. Some farmers bought cheap wires to save money, only to find that these caused energy loss and low voltage (Nōrinshō nōmukyoku 1933, pp. 101–102).

In addition to knowledge, it matters whether a village could raise money by itself if the community wanted to build its own power plant. About 30 percent of Japan's village- and town-owned electric utilities in 1935 concentrated in the mountainous prefecture of Gifu. The reason, as historian Nishino (2020, p. 28) shows, is that many of Gifu's towns and villages had their own public forest, and its revenue financed the communities' electric utilities. The term 'community' sometimes obscures social stratification; both landlords and tenant farmers may belong to a village community. If the American experience serves as a guide, then high tenancy rates correlate with low levels of rural electrification (Hirsh 2022, p. 42). In 1929, about 48 percent of Japanese farmers plighted land they did not owe (Takeda 2019, p. 218). However, Nishino's (2020, pp. 88–89 and pp. 106–33) case studies on Gifu Prefecture and Nagano Prefecture shows that tenancy seems not a hindrance to the creation of public-owned utilities, because in many cases, landowners and tenants shared the interest in public forest and the landowners were willing to pay for social capital such as electricity for the community. Nishino may be biased for his practical concern over the shortcomings of Japan's centralised electricity supply system that led to the Fukushima nuclear accident. But the historical case studies indicate that local communities before the mid 1930s could electrify themselves if they had the necessary financial resources, whether from public forest or landlords.

As such, the creation of public-owned utilities faced many difficulties in regulation context, knowledge expertise, and financial resources, but the number of public-owned utilities did increase in the 1920s. Village-owned utilities first appeared in 1913; their number increased rapidly during the 1920s, rising from 5 in 1919 to 62 in 1929, but stagnated in the 1930s and even declined in the Second World War; by its peak in 1938, there were 68 village-owned electric utilities in Japan (Kikkawa 2004, p. 107; for an informative list, also see Nishino 2013, pp. 183–84). Most of the village-owned utilities (87.5 percent) were based on hydropower (Nishino 2013, pp. 185–86). A few used combustion-based power, either because the village was located in an isolated island or it had no water source nearby. Some villages purchased electricity from an external utility. Overall, the village-owned utilities were small in size, with an average power generation capacity of 163 kilowatt.

In addition to village ownership, rural cooperatives also increased in the 1920s. The first rural electric cooperative in Japan was formed in 1915. The number of rural electric cooperatives remained low in the early 1920s, with only 8 in 1922, but the number increased to 221 in 1932 (Nishino 2020, p. 119). The cooperatives were self-reliant. Ministry of Agriculture's report in 1927 noted that most rural electric cooperatives were launched with money raised by members themselves, with only 9 cooperative across Japan that had received small amount of subsidy from a village authority (Nōrinshō nōmukyoku 1927, p. 71). Most of the cooperatives (about 60 percent) used hydropower as power source, whereas about a third (36 percent) purchased electricity from

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

Table 2. Location, number, capacity, and power source of rural electric cooperatives (as of June 1933)

		Power generation capacity and source (KW)				
Location	Number	Hydropower	Steam	Combustion	External	Total
Hokkaido	3				441	441
Aomori	1	45				45
Iwate	3	13.5			15	28.5
Miyagi	0					
Akita	3	22			3	25
Yamagata	0					
Fukushima	0					
Ibaraki	0					
Tochigi	6	23.5			6	29.5
Gunma	2	17			10	27
Saitama	1				30	30
Chiba	0					
Tokyo	2				130	130
Kanagawa	0					
Niigata	5	2			60	62
Toyama	7	313.5			44.5	358
Ishikawa	3	12			4	16
Fukui	14	67.75			12	79.75
Yamanashi	4	64				64
Nagano	14	305.3			20	325.3
Gifu	16	82.4			45	127.4
Shizuoka	11	70.15	0.5		44	114.65
Aichi	25	92.75			139.7	232.45
Mie	0					
Shiga	0					
Kyoto	12	68.3				68.3
Osaka	0					
Hyogo	4	7			1	8
Nara	2	9				9
Wakayama	1				13	13
Tottori	4	34.5				34.5
Shimane	1	21				21
Okayama	8	35			43	78
Hiroshima	7	151.5	8		20	179.5
Yamaguchi	2			30		30
Tokushima	15	86		5	7.3	98.3

(*Continued*)

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

Table 2. (*Continued*)

Location	Number	Power generation capacity and source (KW)				
		Hydropower	Steam	Combustion	External	Total
Kagawa	1			8		8
Ehime	6	10			38	48
Kochi	3	4			4.5	8.5
Fukuoka	13	116.5	9	15	10	150.5
Saga	3	84.5				84.5
Nagasaki	4	5	30	50	5	90
Kumamoto	4	25.5				25.5
Oita	14	113.9			77.5	191.4
Miyazaki	1	46				46
Kagoshima	4	92			20	112
Okinawa	0					
Total	229	2040.55	47.5	108	1243.5	3439.55

Source: Nōrinshō nōmukyoku 1933, pp. 120–22.

an external utility; some also used steam- or combustion-based power. A typical rural electric cooperative had a small generation capacity, with an average of 15 kilowatt per cooperative in 1933 (calculated from Table 2), much smaller than village-owned utilities. For reference and to see how miniature the public-owned utilities were, the transmission system from Lake Inawashiro, Fukushima, to Tokyo, as we mentioned in the opening of Section 3, generated electricity from the Inawashiro hydropower station, whose generation capacity in 1933 stood at 96,000 kilowatt. The widespread use of small hydropower in rural Japan represents a grassroots aspect of Japan's electrification.

Despite the smallness, the village-ownership and rural electric cooperatives in the 1920s indicated the self-reliance of the local communities. In contrast to big cities such as Tokyo, which represented Japan's technological frontier and world-class electrical engineering, there were also small-scale, appropriate, and self-reliant technologies in the rural, the ordinary, and the periphery (for similar cases in East Asia, see Ghosh 2025). Together with the private-owned utilities, the local initiatives constituted another side of Japan's rural electrification.

Policy: transition from non-intervention

As an important policy background of Japan's rural electrification, the Ministry of Communication adopted a noninterventionist stance towards electrification in general until the beginning of the 1930s. Ideology maybe part of explanation, in about 1910, some politicians had tried to introduce price regulation into the Electric Utility Law (Denki jigyōhō, promulgated in 1911) but had failed because of opposition from the Imperial Diet (Teikoku gikai), Japan's lawmaking authority (Samuels 1987, pp. 137–38). The Ministry of Communication did not regulate prices, nor did it encourage public ownership. Against such a background, there is a reason when historian Kikkawa (2006, p. 205) argues that Japan's electrification before the 1930s should be attributed to the dynamism of private business, not to government policy. It was not until 1931, in face of over-competition between private-owned utilities in the big cities and social

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

discontent over electricity price across the nation, that a parliamentary revision to the Electric Utility Law authorised the Ministry of Communication to regulate electricity tariffs, thereby putting an end to the ministry's noninterventionist tradition.

The ideology of the electric power industry of the 1920s was expressed by Matsunaga Yasuzaemon, head of Tōhō Electric Power, as he warned the elite newspaper *Jiji Shinpō* in 1924 that if the government had the authority to determine tariffs, then electricity might fall victim to votes, parties, and populism.[14] Matsunaga Yasuzaemon is biased from his standpoint within private-owned utilities. He also turned blind eye to regulation tradition in western countries where regulation started with the beginning of central stations in as early as the 1880s (see for example Sakurai 2017). However, his words were borne out by political developments from the late 1920s to the mid-1930s, when Japan's electric power industry changed from more than half century of private-owned utilities' dominance to nationalisation in 1939; akin to a pendulum swinging between two extremes if we consider that in 1951 Japan's electric power industry would be again restructured to private-ownership (for brief history of Japan's electric power industry, see Kikkawa 2006).

The Ministry of Agriculture's report in 1933 noted that until then, the Japanese government had not implemented policies targeting rural electrification (Nōrinshō nōmukyoku, p. 172). This statement is unfair, considering the discrepancies between the two ministries, but it captures the general situation. In the 1920s, the Ministry of Communication had provided farmers with a small amount of government loans to enable the purchase of electrical machinery.[15] However, with the electric power industry being dominated by private-owned utilities, it was left to the farmers to decide how to put the machinery on the grid. It is natural that rural communities developed discontent towards terms unfavourable to them, such as expensive tariffs, high distribution costs, and private monopolies.

In the late 1920s, electricity increasingly became a symbol of political discontent. The interwar years (1919–37) were a time of high levels of rural unrest in general. Rural electrification got caught up in the social discontents. The number of tenancy disputes increased from 408 in 1920 to 5,828 in 1934, and labour strikes rose from 282 in 1920 to 906 in 1930 (Takeda 2019, p. 215). Public disputes over electricity supply was observed as early as 1912, when a village in Nagano refused to buy electricity from a private-owned utility as contracted and instead wanted to launch a village-owned utility of its own. However, the protests in the late 1920s were of an unprecedented scale. A protest against electricity tariff occurred in 1927 in Toyama Prefecture and soon spread across Japan during the Great Depression, with a total of 297 protests occurring from 1930 to 1932. This series of protests was the first time that electricity became the subject of a national debate, with one of the background developments being the introduction of universal suffrage in 1925. The main participants in the protests were members of the local middle class (workers, farmers, and small bourgeois) from villages, towns, and cities. The protests centred on supply conditions, especially electricity tariffs. In the case of Toyama, town and villages boycotted the purchase of electricity from the private-owned utility Toyama Denki, local communities negotiated with Toyama Denki over the reduction in tariffs and demanded public-ownership of electricity. Populist parties such as the Social Democratic Party (Shakai minshū tō, launched in 1926) seized the chance to gain votes in elections by listing rural electrification and the public ownership of electricity (including nationalisation) as political campaign pledges.[16] As historian Shirakisawa (1994, p. 34) noted, although the protests had limited success in the actual reduction of tariffs, their most significant consequence was contributing to the social consensus towards the nationalisation of electricity.

The Great Depression exacerbated the debate over government intervention and pushed for policy change. Net agricultural income rose steadily towards the late 1920s but plummeted during the Depression from 1,005 yen in 1928 to 414 yen in 1931 (Francks 2006, p. 211). Agricultural income did not return to pre-Depression levels until the late 1930s. In 1934, northeast Japan suffered from unusual cold weather and experienced a disastrous harvest failure. Northeast Japan

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

got poorer, and in terms of electrification, became dimmer. The percentage of northeast households with access to electric light declined from 1930 to 1935 (Smith 2001, pp. 23–24). While the number of tenancy disputes declined in the central and the southwest, northeast Japan saw more disputes than before (Francks 2006, p. 238). The economic revitalisation of the northeast became an urgent political agenda, and rural electrification became a part of the rescue schemes.

Against such a background, the Ministry of Communication began offering a special subsidy for rural electrification in 1935. The subsidy covered 70 percent of the expense for installing electric power systems, with main receivers being private-owned utilities. The financial burden of distribution borne by rural residents was thereby reduced. In 1935, a total of 109 places in northeast Japan received the subsidy. The subsidy was extended to other Japanese regions starting in 1936 (Nōji denka kyōkai 1940, pp. 277–78). The Ministry of Communication still aimed to encourage rural electrification through private-owned utilities rather than public-owned ones (including rural electric cooperatives). Nevertheless, the 1935 subsidy was the first time that the Ministry of Communication offered direct government support for rural electrification in substantial amount.

Another policy transition was the nationalisation of electricity in northeast Japan in 1936. On 26 February 1936, a section of the Japanese army caused a mutiny, attacked the prime minister's residence, and killed some ministers. Afterwards, a new generation of fascist-minded technocrats (called reform bureaucrats) assumed political power. With support from populist right-wing ultranationalist, Japanist, and pan-Asianist groups, the reform bureaucrats set ambition to address the evils of laissez-faire capitalism, such as inequalities and rural poverty (Mimura 2011, pp. 35–39). The nationalisation of electricity was caught up as one of the agendas.

In May 1936, a bill aimed at the nationalisation of northeast Japan's electricity system was brought to the Imperial Diet. Rural electrification became a topic of focus in the Imperial Diet's debates. For example, Congressman Hayashi Heima mentioned that some villages were forced to pay private-owned utilities enormous sums in tariffs, even though it was well known that half the price sufficed if the villages built their own power plants (Shūgīn jimukyoku 1936, p. 26). Hayashi called this phenomenon 'exploitation of the poor'. Congressman Kimura Takeo raised another point, namely, that private-owned utilities charged villages higher prices than did rural cooperatives even though private-owned utilities had surplus power generation capacity (Shūgīn jimukyoku 1936, p. 36). These opinions represented some truth from the demand side, but they did not take into consideration the economic rationale such as distribution cost and load factors behind electricity pricing. Nor did they give fair treatment to the fact that the country as a whole, most of Japanese households had been connected to the grid and the private-owned utilities did make a contribution to that despite their profit-seeking motivations. After all, in the mid 1930s, the urban–rural gap in electrification was interpreted as a symbol of inequality, and the electric power industry, dominated by private-owned utilities, was understood as oppression of the poor. In June 1936, the Imperial Diet passed a bill for the nationalisation of northeast Japan's electricity system. The state-owned Northeast Promotion Electricity Company (Tōhoku shinkō denryoku) was launched in October 1936. A few years later, Japan's entire electric power system was nationalised during the Second World War. The electrification of northeast Japan proved to be a prelude to this development, and the dispute over rural electrification was one of the tipping points.

Conclusion

This paper traces the history of Japan's rural electrification before the mid 1930s using a framework adapted from Hirsh (2022), with a focus on the interplay among private-owned utility, local community, and public policy. With the narrative, we argue that private-owned utilities played an important role in Japan's rural electrification achievements. In international

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

comparisons, Japan's electrification was generally a rapid process, and Japan's rural electrification may also be considered relatively successful despite shortcomings in terms of the rural-urban gap, insufficient agricultural power, and inferior average illumination conditions. Although extending systems to the countryside might be uneconomical compared with electrifying densely populated cities, the rural market provided business opportunities when private-owned utilities wanted to balance load factors and sell surplus power generation capacity.

However, we also highlight the limitations of private-owned utilities. The rural communities were charged higher prices for electricity, faced inferior supply conditions, and argued with private-owned utilities over how to electrify villages. When profit-seeking business was the ideological basis for distributing electricity, local communities were left to themselves to obtain electrification. Some communities tried public ownership, but the Ministry of Communication was not always favourable to local initiatives. The government's noninterventionist policy aroused social discontent that aired itself in the late 1920s in tariff protests and, with the onset of the Great Depression, pushed the government to change its policy from noninterventionist to subsidisation and eventually to nationalisation.

With respect to the dominance of private business in electric power industry, Japan is comparable to the United States. As historian Kikakwa (2006) noted, Japan's electric power industry represented a very peculiar case in world history amidst the traditional dominance of private ownership. The nationalisation of Japan's entire electricity system occurred from 1939 to 1951, a relatively short interval considering its nearly 150 years of electrification since the 1880s. Nevertheless, there is still a notable difference in the electrification trajectories, if compared with the United States. By the beginning of the 1930s, Japan had already connected nearly 90 percent of households, including rural dwellings, to power, whereas American farms needed to wait for the REA of 1935, which increased the farm electrification rate from 11 percent to 86 percent over the next fifteen years (Hirsh 2018, p. 317). As such, private-owned utilities made a significant contribution to Japan's rural electrification despite the many necessary evils caused by profit-seeking before the mid-1930s. The paper joins the revisionist historiographies in highlighting the important role that private-owned utilities once played in electrifying the countryside.

Acknowledgements. Many thanks to the anonymous reviewers and to Carl Griffin for their valuable comments.

Notes

1 *Chūgai Shōgyō Shinpō,* 2nd January 1925
2 *Chūgai Shōgyō Shinpō,*10th August 1928 and 24th August 1929.
3 *Tokyo Asahi Shinbun*, 25th April 1924.
4 *Tokyo Asahi Shinbun*, 9th September 1924 and 10th September 1924.
5 *Osaka Asahi Shinbun*, 24th March 1929.
6 *Kokumin Shinbun*, 23th August 1924.
7 *Osaka Asahi Shinbun*, 11th June 1927.
8 *Osaka Asahi Shinbun*, 31st August 1927.
9 *Osaka Mainichi Shinbun*, 17th November 1925.
10 *Chūgai Shōgyō Shinpō*, 20th November 1930 and 27th November 1930.
11 *Chūgai Shōgyō Shinpō*, 5th February 1927.
12 *Chūgai Shōgyō Shinpō*, 20th November 1930 and 27th November 1930.
13 *Osaka Asahi Shinbun*, 12th June 1935.
14 *Jiji Shinpō*, 3rd January 1924 and 5th January, 1924
15 *Kokumin Shinbun*, 10th November 1926; *Chūgai Shōgyō Shinpō*, 9th April 1927.
16 *Kōbe Matashin Nippō*, 12th July 1927.

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

References

Brassley, P., Burchhardt, J. and Sayer, v eds. 2017. *Transforming the Countryside: The Electrification of Rural Britain* (London).
Cater, C. 2019. *Regenerating Dixie: Electric Energy and the Modern South* (Pittsburgh).
Chappells, H. and Shin, H. 2018. 'Making material and cultural connections: the fluid meaning of 'living electrically' in Japan and Canada 1920-1960', *Science Museum Group Journal*, published online, https://doi.org/10.15180/180904 (accessed 24 March, 2025).
Chatterjee, E. 2020. 'The Asian Anthropocene: electricity and fossil developmentalism', *The Journal of Asian Studies*, **79** (1): 3–24.
Cross, J. 2019. 'No Current: electricity and disconnection in rural India', in S. Abram, B.R. Winthereik and T. Yarrow eds., *Electrifying Anthropology: Exploring Electrical Practices and Infrastructures* (London).
Dengyō jidaisha ed. 1934. *Denki īnkaigi gijiyōran* (Tokyo).
Denkigakkai ed. 1939. *Honpo niokeru bankin no denki kōgaku* (Tokyo).
Denkijigyō saihenseishi kankō iinkai ed. 1952. Denkijigyō saihenseishi (Tokyo).
Francks, P. 2006. *Rural Economic Development in Japan: From the Nineteenth Century to the Pacific War* (London).
Fukao, K., Nakafura, N. and Nakabayashi, M. eds. 2017. *Iwanami kōza nihon keizai no rekishi*, vol. **4** (Tokyo).
Garrués-Irurzun, J. and Iriarte-Goñi, I. 2023. 'Rural electrification in Spain: territorial expansion and effects on the agricultural sector (c. 1900–c. 2000)', *Rural History*, **34** (2): 201–19.
Ghosh, A. 2025. 'The significance of small things: small hydropower in the People's Republic of China, 1949–1983', *Comparative Studies in Society and History*, **67** (1): 141–68.
Glaser, L. 2009. *Electrifying the Rural American West: Stories of Power, People, and Place* (Nebraska).
Harrison, C. 2016. 'Race, space, and electric power: Jim Crow and the 1934 North Carolina rural electrification survey', *Annals of the American Association of Geographers*, **106** (4), 909–31.
Hasenöhrl, U. 2018. 'Rural electrification in the British Empire', *History of Retailing and Consumption*, **4** (1): 10–27.
Hausman,W., Hertner, P. and Wilkins, M. 2008. *Global Electrification: Multinational Enterprise and International Finance in the History of Light and Power, 1878-2007* (Cambridge).
Hirsh, R. 2018. 'Shedding new light on rural electrification: the neglected story of successful efforts to power up farms in the 1920s and 1930s', *Agricultural History*, **92** (3): 296–327.
Hirsh, R. 2022. *Powering American Farms: The Overlooked Origins of Rural Electrification* (Baltimore).
Hirt, P. 2012. *The Wired Northwest: The History of Electric Power, 1870s–1970s* (Lawrence).
Hughes, T. 1983. *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore).
Jacome, V. 2023. 'Limits of energy access research on unreliability', *Journal of International Development*, **35** (8): 2626–44.
Kikkawa, T. 2006. 'The role of Matsunaga Yasuzaemon in the development of Japan's electric power industry', *Social Science Japan Journal*, **9** (2): 203–19.
Kikkawa, T. 2004. *Nihon denryokugyo hatten no dainamizumu* (Nagoya).
Kline, R. 2000. *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore).
Kurihara, T.1964. *Denryoku* (Tokyo).
Kwoka, J. 1996. *Power Structure: Ownership, Integration, and Competition in the U.S. Electricity Industry* (New York).
Luarsabishvili, V. (2023). *Ideas and Methodologies in Historical Research* (London).
Martiin, C. 2017. 'Rural electrification in Sweden: a comparison', in P. Brassley, J. Burchhardt and K. Sayer, eds., *Transforming the Countryside: The Electrification of Rural Britain* (London).
Mimura, J. 2011. *Planning for Empire: Reform Bureaucrats and the Japanese Wartime State* (Ithaca).
Minami, R. 1965. *Tetsudō to denryoku* (Tokyo).
Minami, R. 2008. 'Income distribution of Japan: historical perspective and its implication', *Japan Labor Review*, **5** (4): 5–20.
Moss, T. 2022. 'Refracting urbanism: the multiple histories (as well as geographies) of the networked city', *Journal of Urban Technology*, **29** (1): 127–33.
Navickas, K. 2019. 'Conflicts of power, landscape and amenity in debates over the British Super Grid in the 1950s', *Rural History*, **30** (1): 87–103.
Needham, A. 2015. *Power Lines: Phoenix and the Making of the Modern Southwest* (Princeton).
Neufeld, J. 2016. *Selling Power: Economics, Policy, and Electric Utilities Before 1940* (Chicago).
Nishino, T. 2013. 'Senzen niokeru chōson ei denki jigyo no ruikeika nikansuru ichi kōsatsu (1)', *Chīki seisaku kenkyū*, **15** (3): 181–95.
Nishino, T. 2018. 'The history of electric enterprises and power supply development in Tokyo since the Meiji Era', in T. Kikuchi and T. Sugai, eds., *Tokyo as a Global City* (Singapore).
Nishino, T. 2020. *Nihon chīki denka shiron: Jūmin ga denki wo tomoshita rekishi ni manabu* (Tokyo).
Nōji denka kyōkai. 1940. *Honpō ni okeru nōji denka hattatsushi* (Tokyo).
Nōrinshō nōmukyoku. 1927. *Sangyō kumiai shisetsu jikayō denki kōsakubutsu nikansuru chōsa* (Tokyo).
Nōrinshō nōmukyoku. 1928. *Nōgyō yō kigu kikai fukyū jōkyō chōsa* (Tokyo).
Nōrinshō nōmukyoku. 1933. *Honpō nōson denka nikansuru chōsa gaiyō* (Tokyo).

https://doi.org/10.1017/S0956793325000081 Published online by Cambridge University Press

Nye, D. 2023. 'A model for heterogeneous energy transitions', in W.B. Carlson and E.M. Conway, eds., *Electrical Conquest: New Approaches to the History of Electrification* (Cham).
Phillips, S. 2007. *This Land, This Nation: Conservation, Rural America, and the New Deal* (Cambridge).
Plutshack, V. and Merck, A. 2024. 'Women work particularly well in community organizations: cultivating community and consumerism in the Comanche County REA Women's Club, 1939–1940', *Agricultural History*, **98** (2): 147–86.
Powell, D. 2018. *Landscapes of Power: Politics of Energy in the Navajo Nation* (Durham).
Sakurai, T. 2017. 'Historical backgrounds about the developmental difference of electric utilities in Germany and Japan: municipalization and concession', in R. Andeßner, D. Greiling and R. Vogel, eds., *Public Sector Management in a Globalized World. NPO-Management* (Wiesbaden).
Samuels, R. 1987. *The Business of the Japanese State: Energy Markets in Comparative and Historical Perspective* (Ithaca).
Sandwell, R. 2017. 'People, place and power: rural electrification in Canada, 1890–1950', in P. Brassley, J. Burchhardt and K. Sayer, eds., *Transforming the Countryside: The Electrification of Rural Britain* (London).
Shin, H. 2019. 'At the edge of the network of power in Japan, c. 1910s–1960s', in S. Abram, B.R. Winthereik and T. Yarrow, eds., *Electrifying Anthropology: Exploring Electrical Practices and Infrastructures* (London).
Shin, H. 2025. 'Fukushima before nuclear power: developmentalism, substates, and the landscape of energy extraction in Japan', *Environmental History*, **30** (1): 33–60.
Shirakisawa, R. 1994. 'Shōwashoki no denki ryō nesage undō', *Rekishigaku Kenkyu*, **660**: 16–34.
Shūgīn jimukyoku ed. 1936. Dai 69 kai teikoku gikai shūgīn tōhoku kōgyō kabushikigaisha hōan hoka ikken īnkai dai 1 gō (12 May, 1936) (Tokyo).
Sōrifu tōkeikyoku. 1972. *Nihon tōkei nenkan* (Tokyo).
Smith, K. 2001. *A Time of Crisis: Japan, the Great Depression, and Rural Revitalization* (Cambridge, MA).
Takeda, H. 2019. *Nihon keizai shi* (Tokyo).
Teishinshō denkikyoku. 1937. *Rinji denryoku chōsakai shō iinkai gijiroku* (Tokyo).
Tobey, R. 1996. *Technology as Freedom: The New Deal and the Electrical Modernization of the American Home* (Berkeley).
Uchikawa, T. 2020. '1930 Nendai tōhoku niokeru teishinshō haiden setsubi josei seisaku no kenkyū', *Nihongo nihongaku kenkyū* **10**: 67–86.

Cite this article: Li C (2025). Japan's rural electrification before the mid-1930s: Private-owned utility, local community, and policy. *Rural History*, 1–17. https://doi.org/10.1017/S0956793325000081