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Resumen

En Finlandia la tendencia a municipalizar los servicios públicos de suministro eléctrico urbano fue muy acusada desde finales del s. XIX hasta la Segunda Guerra Mundial. La penetración de grandes compañías alemanas de electrotecnia, como AEG y Siemens & Halske, en el sector del suministro de electricidad finlandés iba contra la norma en esa época. Mediante estudios de caso, en el artículo se examinan las razones por las que AEG tuvo más éxito que otras compañías transnacionales a la hora de hacerse con los servicios públicos de suministro de electricidad en Finlandia. Técnicamente, los sistemas de suministro de electricidad proporcionados por AEG eran aplicables y modernos, pero tuvieron que enfrentarse a una creciente resistencia en el país aún antes de la Primera Guerra Mundial. Los principales argumentos contra AEG y otras compañías privadas de servicio de suministro eléctrico consistían en que cobraban tarifas superiores y eran reacias a ampliar sus redes a la periferia de las ciudades. El resultado fue que todos los servicios públicos operados por AEG y otras compañías electrotécnicas extranjeras se municipalizaron en el período de entreguerras.

Palabras clave: Electrificación; municipalización; nacionalismo económico; inversión extranjera; compañías multinacionales.

Abstract

Finland was a country where the trend to municipalise urban electricity supply utilities was very strong from the late 19th century to World War II. The penetration of big German electro-technical companies, such as the AEG and Siemens & Halske, into the Finnish electricity supply business was against the tide of the time. By means of case studies, the article examines reasons, why the AEG was more successful than other transnational companies in taking over electricity supply utilities in Finland. Technically the electricity supply systems delivered by the AEG were applicable and up-to-date but they faced increasing resistance in Finland even before World War I. Main arguments against the AEG and other private electricity supply utilities included that they charged higher rates and were reluctant to expand their networks to suburbs of cities. The result was that all utilities operated by the AEG as well as other foreign electro-technical companies were municipalised in the inter-war period.

Key words: Electrification; municipalisation; economic nationalism; foreign investments; multinational companies.

Foreign investments in Finnish electricity supply utilities, 1884-1936

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1. Points of Departure

Building water, gas and electricity supply utilities in the late 19th century was a new type of business –especially in the European periphery. In this circle around the core countries, electrification met more hardships than in the advanced countries of Western and Central Europe. Peripheral regions often lacked suitable capital, entrepreneurs, technical knowledge, machinery, equipment, engineers, legislation, and favourable societal atmosphere.

The transfer of technology and imports of materials and equipment was a necessity, even if some domestic production had already started in this technological sector. In addition, investing in supply utilities and operating them also demanded for funds, management skills and technical expertise. In electrifying countries, several organisational solutions were applied to setting up pipebound and wirebound supply utilities. These solutions can be categorised in the following six models:

1) Local, independent private utility. A supply utility was a company of one or more local investors, whose motives were to earn profit, provide services to their communities and gain concessions from the municipal government for further business activities.

2) Utility as a subsidiary. A local factory might set up a utility as its subsidiary. It might do business by selling some surplus gas, electricity, cold or hot water to the surrounding quarters. The motivation was often to support its workers, employees and surrounding residential communities, and/or utilise some of its refuse, such as wood waste, profitably.

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3) Utility owned by its customers. Ordinary citizens— including merchants who often were initiators and organizers of these schemes— could join their efforts to establish an utility to serve infrastructure services, such as gas, electricity and water. Utilities possessed by their consumers might be limited companies or co-operatives.

4) Municipal utility. Municipal councils also founded various supply utilities and this activity speeded up from the 1890s. Collective interests, such as fire exhaustion or street lighting, frequently laid behind these expensive investments. The will to serve citizens and develop their cities also formed important motivations. Providing water, gas and electricity to local small business was part of municipal industrial policy. Furthermore, environmental concerns involved in the operation of utilities rose in some cities surprisingly early. In various cases, these concerns were included in factors that favoured the municipalisation of infrastructure utilities.

5) Utility owned by the manufacturers of electrical machinery and/or investment banks. In some cases inhabitants were ready to buy services but they or their organisations did not have enough capital for utility investments. Therefore, a model emerged where municipalities granted concessions for private firms to build and run electrical supply utilities in their areas. Quite often these firms were manufacturers of technical equipment built utilities using their own products and workforce. Generally, manufacturers of electrical machinery also owned utilities entirely or partly – at least some years. Sometimes they organized funding of utilities in cooperation with ordinary or special investment banks. Both domestic and foreign electrical engineering companies applied this business model.

6) Mixed model. There were also utilities with mixed ownership (a combination of two or more of the above models).

Companies representing the models 1-3 and 5-6 were dependent on the concessions of the city councils, and the concessions were generally limited to a certain time period. In the model 4, the utility was owned by the city council and had an opportunity to work in a very long perspective.

In the European periphery, big foreign electro-technical manufacturers in cooperation with financial institutions were involved especially in the electrification of urban areas between 1885 and 1939¹. Variations of the above-mentioned model 5 were widely applied in Russia, Eastern Europe, the Iberian Peninsula and even in Italy².

Around the turn of the century, the trend in the Nordic Countries was that the market shares of both municipally owned utilities and utilities run by electrical engineering companies increased³. Foreign electrotechnical manufacturers ente-

¹ Broder (1982); and Hertner (1986).

² Coopersmith (1992), pp. 37-41; Hertner (1981); Kirchner (1982); Myllyntaus (1997); and Rauber (1985).

³ Åkerman (1933), p. 42; Raevuori (1938), pp. 34-35 and 98-105; Svensson (1962), p. 142; Vogt (1971), p. 13; and Vleuten (1998), pp. 107-113.

red also in Finland and began to make direct investments in electricity supply utilities and tramway companies. At the same time, other types of utilities considerably lost their market shares. Competition became sharper and business constellations developed more complex. Infrastructure services have always been also political issues, but debate turned heated when financial inputs soared to significant sums or if services were not satisfactory.

The aim of this article is to study why foreign-owned electricity supply utilities emerged in Finland and why they disappeared for more than sixty years until they returned when the Finnish electricity supply sector was liberalised in the 1990s. In addition by means of case studies, the article examines reasons, why one German electro-technical manufacturer was more successful than other transnational companies in taking over electricity supply utilities in Finland. The pivotal argument in the article is that the municipally ownership model was gaining the upper hand even before World War I, which finally solved the debate on organisational solutions for supplying electricity to urban areas.

2. Internationalisation of the Electrical Engineering

In the late 19th century, the electrical engineering industry was a new and rapidly changing manufacturing sector. At first, fairly small firms began to produce electrical equipment for regional or national purposes. Various countries had their national engineering works supplying materials and machinery for domestic customers. Soon the biggest companies started exporting, primarily dynamos, generators, cables, switches and various kinds of arc lamps and bulbs. Another way for technology transfer was selling patents and production licenses to foreign companies. Both transactions of products and immaterial rights were done by using agents and agencies, which knew the conditions in the host countries⁴.

A great change took place from the 1890s. In one country after another, the sales and manufacturing subsidiaries of big transnational companies sprang up besides the national workshops and installation firms. The electrical equipment business was swiftly internationalised and a world market for these products evolved. Worldwide competition for market shares began between few giant transnational companies. Minor manufacturers relying primarily on their own national markets often found themselves overpowered by the rivalry of the transnational companies, which had much bigger resources. The general framework of the modern worldwide electrical business was established by the year 1905⁵.

American electrical companies were the trailblazers in setting up subsidiaries abroad. In England the Anglo-American Brush Electric Light Corporation was organised in 1880 to exploit British rights for the arc-lighting system innovated by the American Charles F. Brush, whose company in the USA was then thriving. Thomas A. Edison became an entrepreneur in the electrical equipment business in

⁴ Myllyntaus (1990) and (1991).

⁵ Byatt (1979), pp. 71-72.

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the late 1870s, and a few years later he founded subsidiaries abroad as well. These subsidiaries, such as the Edison Electric Light Company Ltd set up in England in 1881, were to exploit the Edison system through the licencing, sale and manufacture of system components through supplying light⁶.

The transformers and dynamos designed by the American professor Elihu Thomson laid the foundation for the Thomson-Houston Electric Company in 1883 and soon subsidiaries and agencies were opened abroad. One year later, George Westinghouse began to build up his corporation with dependent companies in major foreign countries. The American companies soon strengthened their position in the world market by merging. In 1889 Thomson-Houston bought the Brush company, while various Edison companies consolidated into the Edison General Electric Co. Only three years later, the latter was merged with Thomson-Houston under the name General Electric⁷.

Many of the big transnational electrical engineering companies emanated in the countries where rapid industrialisation and a large home market provided a good basis for growth, a strong demand for electrical equipment and a developed capital market. In the late nineteenth century, these characteristics prevailed in the USA and also in Germany where several transnational electrical engineering companies emerged. The earliest of these companies, Siemens & Halske, had specialised in electrical communication engineering since the 1840s, and later also gained a strong foothold in heavy current engineering⁸. The company significantly grew under the management of the Siemens family⁹. In 1875 it employed about 600 people. In Germany, there were then other electrical firms with about 560 employees in total. One of them, Schuckert & Co, founded in Nuremberg in 1874, swiftly developed into another considerable international supplier of dynamos and became interested in the markets in the Baltic Sea rim as well. In Finland, Schuckert was the first foreign electrical firm to use a local agent, namely Daniel Joh. Wadén. However, in the same year, 1882, its Swedish agent, *Luth & Roséns Elektriska Ab* from Stockholm, also started to install its equipment in the Grand Duchy¹⁰.

The Edison subsidiary in Germany, *Deutsche Edison Gesellschaft*, founded in 1883, was reorganised four years later and became an independent giant corporation under the strong German-Jewish businessman, Emil Rathenau (1838–1915).

⁶ Hughes (1962), pp. 29-30.

⁷ MacLaren (1943), pp. 170-98; and Körner (1927), pp. 870-871.

⁸ Siemens & Halske founded manufacturing plants in Berlin in 1847, in St. Petersburg in 1855, in London in 1858, in Paris in 1878, in Vienna 1879, in Tokyo in 1887 and in Chicago in 1892. Manufacturing the equipment for telegraph transmission was as a rule very important for these factories in their early years. Finland was a too small market for a factory of telegraphs and their equipment. Winterfeld (1913), p. 20ff; and Weiher (1980), p. 42.

⁹ The founder of the company, Werner Siemens, made theoretical contributions in dynamo-electric principles and constructed his famous dynamo in the years 1866–1867. In 1888, the King of Prussia rewarded the achievements of Werner Siemens (1816–1892) in electrical technology by raising him to the nobility. Siemens, Werner von (1897), pp. 252-253; Repo (1958), p. 15.

¹⁰ Siemens, Georg (1957), pp. 150-151; and Körner (1927), p. 870ff.

Under the name of the *Allgemeine Elektrizitäts-Gesellschaft* (AEG) it evolved from an installation firm to a prominent transnational electro-technical manufacturer. A link between the AEG, and the Edison corporation and its successor prevailed for several decades. Their mutual agreements included, among other things, the delivery of sole sales rights for some geographical area; thus North America went to the Edison corporation and Europe east of Germany and the whole of Russia to the AEG. Consequently, Finland fell into the AEG's sphere of influence¹¹.

Among the other German electrical firms actively engaged abroad were *Felten & Guillaume* in Mühlheim, *Helios AG* in Cologne (est. 1882), and *Lahmeyer & Co* in Frankfurt-on-Main (est. 1890). Furthermore, in 1892 Thomson-Houston and *AG L. Loewe & Co* jointly founded the *Union Elektrizitäts AG* in Berlin to exploit the patents of the former, especially in the electrification of tramways in Europe. All these German electrical firms were severely hit by the depression just after the turn of the century. Consequently, *Helios AG* went bankrupt, *Schuckert & Co* was merged with *Siemens & Halske AG*, and the *Union* with the AEG in 1903. About seven years later, the AEG also took over *Lahmeyerwerke* from *Felten & Guillaume AG*¹².

The AEG and Siemens & Halske AG evolved as two true transnational giants of the electrical business, becoming the biggest and fourth biggest electrical companies in the world by 1911¹³. British, French, Belgian and Dutch electrical manufacturers had only limited significance outside their own countries and colonies. By contrast, some notable transnational companies sprang up from a few smaller but rapidly industrialising countries. The Swiss electrical firms, *Oerlikon Maschinenfabrik* founded in 1882 in Zürich and *Brown, Boveri & Co* set up in 1891 in Baden, soon extended their business activities abroad from their comparatively limited home market. In northern Europe, the Swedish company, *Allmänna Svenska Elektriska Aktiebolag* (ASEA), grew into an important manufacturer of electrical equipment. This company was established in 1883 in Aalborga to exploit the patents and innovations of the Swedish inventor Jonas Wennström (1855-1893)¹⁴.

Until the early 1890s, several Finnish firms imported and installed foreign electrical machinery as appointed agents. The world market for electrical equipment was transformed at the close of the nineteenth century when oversupply and sharp competition emerged. When demand in the home market became saturated

¹¹ Pinner (1918), p. 271ff; *50 Jahre AEG* (1956), pp. 77-111.

¹² Pinner (1918), pp. 223-250; Siemens, Georg (1957), pp. 151-153.

¹³ With a turnover of 86 million US dollars, the AEG in 1911 surpassed for the first time the General Electric Co. with a turnover of 70.4 million dollars. The respective figures for the Western Electric Co. and the Siemens & Halske and the Westinghouse Electric Manufacturing Co. were 66.2, 66.0 and 34.2 million dollars. *New-Yorker Handelszeitung* (1913) quoted in *Teknikern* (1913) no. 828, p. 152.

¹⁴ Åkerman (1933), pp. 17-33; Körner (1927), pp. 875-83.

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in countries such as Germany, the USA, Switzerland and Sweden, the big electro-technical firms directed their sales efforts more actively abroad.

The earliest foreign electrical firm to set up a subsidiary in Finland was the Swedish ASEA company in 1897. Four years earlier, the ASEA had appointed its first agent abroad in Helsinki with a branch in St. Petersburg. The ASEA and its Finnish agent, Gustaf Zitting, decided to establish a manufacturing subsidiary to produce generators and motors under licence both for the Finnish and Russian markets¹⁵. Although the Russian tsar ruled Finland from 1809 to 1917, the country was not a province of Russia. Politically it was an autonomous grand duchy with own diet, own central government, own taxes and budget and even from 1860 own currency, *markka*. In addition, a custom border separated the Finnish economy from the Russian one. Lower import duties of Russia favoured Finnish products in the imperial markets compared to their foreign competitors. The grand duchy did not, however, provide a lucrative loophole for foreign exporters to the imperial market, because strict regulations on the country of origin limited transit trade via Finland to Russia to a minimum. As a result, Finland was a special market parted from the rest of the Russian empire.

After a promising start, the joint-venture of ASEA and Zitting, known as the *Finska Elektriska Aktiebolag* (FEAB), did not manage to make a real breakthrough either in the Finnish or Russian market¹⁶. In 1904 tough competition in the depressed markets forced to close FEAB's factory in Helsinki and its installation workshop in Tampere. For the next ten years, the engineering office Zitting & Co represented the ASEA's products in Finland. In 1913, the parent company opened up its sales subsidiary, namely *Allmänna Elektriska Aktiebolag i Finland* in Helsinki¹⁷.

In the late 1890s, German firms started a strong penetration into countries with a weak domestic electrical engineering industry such as Britain and Russia. American, Swiss, French and Belgian electro-technical firms also attempted to gain a foothold there¹⁸. The German firms were, however, superior in Russia, which Emil Rathenau, for example, came to see as '*ein land der Zukunft*' (a country with a future). In 1898 the AEG changed its policy in Russia from appointing agents only to establishing its own 'installation office' in St. Petersburg¹⁹. An obvious reason was problems to recruit enough reliable and competent agents. The installation of larger machinery also required a more complex organisation and well-trained mechanics.

In 1898, the subsidiary of Siemens & Halske in Russia was reorganised as a limited company (*Aktiengesellschaft*) with a nominal capital of four million rou-

¹⁵ Glete (1983), pp. 37-38.

¹⁶ The ASEA owned 34 per cent of the FEAB's capital stock in 1903; the rest was owned by Gustaf Zitting and other Finns. Åkerman (1933), p. 69; Glete (1983), p. 38.

¹⁷ *Mercator* (3.1.1914), vi, 12.

¹⁸ Byatt (1979), pp. 71-2.

¹⁹ Kirchner (1982), pp. 406-409; see also Myllyntaus (1997), pp. 540-549.

bles, and in the same year its parent firm set up a new sales subsidiary in Finland under the name of '*Siemens & Halske AG, Teknisk byrå, Helsingfors*'²⁰. This subsidiary immediately gained a considerable market share and between 1901 and 1905, it was probably the leading provider of generators and electric motors in Finland. At the turn of the century, its biggest delivery was the installation of two Zoelly-turbogenerators, both 500 horsepowers (hp), at a textile factory in Tampere in 1905–1906²¹.

Table 1. The number and capacity of generators and electric motors installed annually by various suppliers in Finland, 1900–1906

Supplier		1900	1901	1902	1903	1904	1905	1906
Wadén	no.	5	-	-	-	-	-	-
	hp.	120	-	-	-	-	-	-
Wahl	no.	46	20	26	35	29	18	19
	hp.	..	..	..	..	..	..	..
Strömberg	no.	79	72	..	81	141	185	..
	hp.	981	684	..	1365	1600	2700	..
Electron	no.	..	..	26	..	..	..	..
	hp.	..	..	530	..	..	..	..
ASEA/FEAB	no.	22	25	..	..	..	..	..
	hp.	1000	..	..	..	..	..	..
Siemens & Halske	no.	..	..	..	..	109	153	198
	hp.	..	..	1805	..	1250	4250	4580
AEG	no.	..	79	72	68	128	174	331
	hp.	..	1250	1160	1580	1200	2500	5880
Mercantile*	no.	-	-	-	-	-	..	..
	hp.	-	-	-	-	-	..	1400

* The Finnish importing company, Ab Mercantile, was appointed as the Finnish general agent by *Felten & Guillaume, Mühlheim-on-Rhein and Lahmeyerwerke A.G.* Frankfurt-on-Main in 1905.

.. No data available

- Logically impossible; the firm did not do this kind of business during this year.

Source: *Teknikern* 1901-1907.

In April 1900, the other German electrical giant, the AEG, opened its first subsidiary in Finland under the name '*Elektriska Aktiebolaget AEG*'. The significant,

²⁰ A year earlier, the parent company in Berlin had been reformed as a limited company with a nominal capital stock of 36 million *Reichsmarks*. Kirchner (1982), pp. 404-405; Körner (1927), p. 872; and Repo (1958), p. 31.

²¹ *Teknikern* (14.3.1906), no. 455, p. 67.

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new operation of the AEG in Finland was organised by the company's subsidiary in Stockholm and not directly by the parent company in Berlin. In early advertisements, the subsidiary in Helsinki was presented as a branch corresponding to those in the Swedish cities of Gothenburg, Malmö, Örebro and Sundsvall²². Its principal working language was Swedish—not German or Finnish. During the first few years, Swedish nationals had at least as central a role in the management of this company as German and Finnish directors, and the same was true of the Siemens & Halske's subsidiary in Helsinki²³.

The AEG's engineering office, as it was called, broke into the market by the sales of small, fully-equipped power plants with new Nernst-lamps and ordinary incandescent lamps to provincial Finnish towns at a very competitive price²⁴. Between 1899 and 1914, the AEG delivered nearly a half of the installations of the new urban electricity supply utilities and after the recession of 1901–1903, it also managed quite well as a provider of industrial generation plants and electric motors²⁵.

According to announcements made by Siemens & Halske and the AEG, both companies had delivered generators and electric motors with a capacity of nearly 30 000 hp in Finland by the end of 1907, whereas the domestic company, Strömberg, had sold similar electrical machinery with a capacity of only about 15,000 hp between 1899 and 1907²⁶. Immediately after that period, Siemens & Halske lost its position as the market leader in Finland to the AEG's engineering office. From 1906 the AEG was the most important supplier of turbogenerators, while it also became the biggest electro-technical firm in the country in terms of the sales of generators and electric motors, as demonstrated in Table 1. The AEG set up more branches in the major Finnish cities than any other electro-technical firm; besides the main office in Helsinki, it opened local branches in Oulu in 1905, in Tampere and Turku in 1906, and in Viipuri (present Viborg) on the Karelian Isthmus in 1907²⁷. The AEG was not only ready to import and install its machinery to Finland, it was keen to make direct investments to promote its sales and earn profit by its technical and managerial expertise. In the heavy current

²² *Teknikern* (1901) no 242.

²³ See articles on Elektriska Aktiebolaget A.E.G and Siemens & Halske Aktiengesellschaft, Teknisk Byrå, Helsingfors, *Suomen kauppa, meriliike ja teollisuus, Helsinki I* (1907-15), pp. 57-61 and 81-86.

²⁴ The Nernst-bulb was an incandescent lamp, which had a filament made from rare earths (zirconium and ytterbium) instead of carbon. The German professor Walther Nernst developed Pavel Jablockov's invention into a commercial product and sold his patents to the AEG. The first Nernst-lamps were on sale in 1900. In Finland, they were used from 1901, for example in the supply utilities of the towns of Lappeenranta and Hamina. *Teknikern* (1902) no. 265, 4; Laurell (1927), pp. 191-192.

²⁵ AEG and Siemens & Halske, *Suomen kauppa, meriliike ja teollisuus, Helsinki I* (1907-15), pp. 57-61 and 81-86.

²⁶ *Ibid.*, *Teknikern* (1900-08); Aktiebolaget Gottfrid Strömberg Osakeyhtiö, *Kotimaisen teollisuuden albumi* (1913), pp 22-25.

²⁷ *Teknikern* (1906) no. 447, p. 18; (1907) no. 504, p. 59; (1908) no. 558, p. 77.

electrical engineering and in the manufacture of turbogenerators, the AEG had at the time took the upper hand of its competitors.

3. Takeovers of Urban Utilities

The first electricity suppliers in Finnish cities were small block DC power plants; some of them started to operate in the 1880s. Two biggest of them (in Helsinki and Viipuri) were owned by Finnish electrical engineering works. In two provincial cities, Kuopio and Porvoo, the first electricity supply utilities were founded by printing companies, which sold their surplus power to their neighbourhoods. In Kotka, a metal workshop set up an electricity supply utility in 1897. In the 19th century, a limited company whose main activity was the generation and delivery of electricity was rare. Vasa Elektriska AB in Vaasa, established in 1893, was the first of this kind of a company²⁸.

For a long time, municipally owned utilities have been a Finnish peculiarity. The first two municipal electricity undertakings in the world were set up in Sweden in the city of Härnösand in 1885 and Växjö in 1887, as indicated in Table 2. The next two were founded in 1888 in the industrial centres of Tampere in Finland and Västerås in Sweden. Bradford in England opened its municipal utility in 1889, just a year later before the second Finnish city, Oulu, started to deliver electricity from its own thermal power plant, which was the most northern urban electricity supplier at the time. The first municipal electricity utility in Germany was opened in Königsberg, the administrative centre of East Prussia, in 1890 – two years prior to the Zurich utility, the first municipally-owned electricity supply utility in Switzerland²⁹.

²⁸ The Archive of the Board of Industry in the National Archive and the Archives of the Central Statistical Centre of Finland.

²⁹ Åkerman (1933), Byatt (1979); Raevuori (1938); Svensson (1962); and Vogt (1971).

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Table 2. The first municipal electrical supply utilities in Europe

Year of opening	City	Country
1885	Härnösand	Sweden
1887	Växjö	Sweden
1888	Tampere	Finland
1888	Västerås	Sweden
1889	Bradford	England
1890	Oulu	Finland
1890	Königsberg*	Germany
1891	Sundsvall	Sweden
1891	Brighton	England
1892	Stockholm	Sweden
1892	Zürich	Switzerland
1892	Hammerfest	Norway
1892	Kristiania**	Norway
1892	Brussels	Belgium
1892	Paris	France
1892	Dublin	Ireland

* Presently called Kaliningrad

** Presently called Oslo

Sources: I.C.R. Byatt, *The British Electrical Industry, 1875–1914* (Oxford, 1979), p. 105; Yrjö Raevuori, *Tampereen kaupungin sähkölaitos* (Tampere, 1938), pp. 34-5 and 98-105; Bengt Svensson, *De första kommunala industriföretagen, Hundra år under kommunalförfattningarna 1862–1962* (Stockholm 1962), p. 142; Fritz Wilen, *Några upplysningar om den elektriska belysningen och dennas nuvarande ståndpunkt* (Åbo, 1888), pp. 18-22; Johan Vogt, *Elektricitetlandet Norge* (Oslo, 1971), p. 13; Johan Åkerman, *En elektriskt havsekkel, Översikt över ASEAs utveckling 1883–1933* (Västerås, 1933), p. 42.

After 1900 most new urban electricity supply utilities were founded, owned and run by the municipality in Finland. One reason for this was related to municipal regulation. For example, utilities needed permissions from city councils to erect high tension lines over streets. As a result, it was not easy to set up competing utilities in the same areas. Another factor was financing. An urban utility was not a very lucrative investment for private investors in its first years, because building infrastructure was expensive but sales were insecure and generally small. Profit to invested capital generally started to accumulate only after a long time lag. However, municipalities could provide a fairly constant load for electricity supply plants and save some money. Hence, the third factor was the obligation of town councils to take care of street lighting. In this respect, electricity was very

competitive in the Finnish circumstances, because gas works operated only in three cities, Helsinki, Turku and Viipuri. It was clear that in the long run electric street lighting was a cheaper solution than oil lamps, which were widely used on the streets of Finnish towns in the 19th century.

By autumn 1914 at least one electricity supply utility was opened in each of 38 Finnish towns. At the time, 23 of these utilities (60%) were owned by the local municipality³⁰. When the main trend in Finland was from the 1880s to municipally owned utilities, it might sound surprising that after the turn of the century, there sprang up tendencies that seemed to push the tide to flow to an opposing direction, to privately owned electricity supply utilities³¹. In this respect, the former capital of Finland, Turku, is a case in point.

The city of Turku received its electricity from a local private electricity utility, Ab Electron, which was opened in 1898. The capacity of this DC-utility became insufficient only in some years. The company met pressures to make new investments in a new power plant and switch to the supply of alternative current. A completely new turn was made when an official of the city administration, engineer Oskar Schultz gave a presentation in the meeting of the society *Åbo Teknici–Turun Teknikot* on February 4 1905 and proposed to set up an electrical tramway in the city. The proposal was supported and a planning committee was founded, although a horse-driven tramway operating in Turku in 1890–1892 was unprofitable and had to be closed³².

The city council considered various alternatives to carry out the building project. It rejected the option of a combined, municipally owned electricity supply utility and tramway services mainly for two reasons: Firstly, considerable financial risks were involved in the project. Secondly, the city administration –or any other Finnish institution at the time– did not have enough technological competence to construct a satisfactory tramway service³³. To give a concession for 40 years to a private company with detailed condition was found the best solution. Tenders were asked from four companies: local Aktiebolaget Electron, the AEG's

³⁰ The Archive of the Board of Industry in the Archives of the Central Statistical Centre of Finland; The Archive of Strömberg Oy; *Teknikern* 1891–1918; various works in local history. Hukka and Katko (2003), p. 32 have presented slightly different figures. According to them, “in 1912 there were 24 municipal and 15 private electricity works in Finnish towns.”

³¹ Hukka and Katko (2003), p. 32.

³² Schultz (1908), pp. 12-13; Ekström (1958), pp. 13-14; Söderström (1990), p. 36.

³³ Following foreign models, tramways started to operate in Finland only in three cities: Helsinki was the first in 1900, Turku was the second in 1908 and Viipuri was the last one in 1912. A common feature for all these cases was that the network was built and the rolling stock was delivered by a big foreign company that also began to operate services. In Helsinki, the delivering company was O. L. Kummer from Dresden, whereas in Turku and Viipuri, the manufacturer and operator was the AEG with its subsidiaries. In Helsinki, the private tramway company gave to Kummer a concession to operate tramways at maximum for three years in order to get a warranty of the quality of deliveries. In 1913 the city council of Helsinki purchased the majority of the capital stock and got the power to make vital decisions in the Tramway and Omnibus Company. Herranen 1988, pp. 48-60; Söderström 1990, pp. 34-36.

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Swedish subsidiary in Stockholm, *Ab Siemens & Halske*, Stockholm and *Allmänna Svenska Elektriska Aktiebolaget* (ASEA), Vesterås, Sweden. Although the deadline was once postponed, only the AEG and the ASEA submitted their tenders. Because ASEA asked the city council to become a share holder of the new company, guarantee a net return of 6% to the capital invested in tramways and the surplus of 30% to the redemption value of the property, its tender was rejected³⁴. Consequently, the concession agreement was signed on September 26, 1906 with the AEG, that had managed to submit a technically and economically very competitive tender. The concession was for 40 years, although the city council could redeem both the electricity supply utility and tramway company ten years later when they were put into commission³⁵. The retail rates (60 pennies per kWh for lighting and 25 pennies for power) were regulated by the city council. Finally, the deliveries of electricity and tram services should start within fifteen months after signing the contract³⁶.

Because the concession of Ab Electron was expiring in 1908, it hired in September 1907 its premises, distribution network and notable installation department to the AEG, while its workforce and customers were taken over by the new company. The old power plant was closed when the AEG's new one with both DC and AC generators was put in operation in autumn 1908³⁷.

The new company was named in a German fashion *Electricitäts Åbo Aktiengesellschaft* and at the time, the company's nominal capital was announced to be 1.2 million German *Reichsmarks* (FIM 1.5m). The company built a new thermal power plant to deliver electricity to the city of Turku as well as to the municipal utility of neighbouring town Naantali and to a nearby rural utility in Maaria and Kaarina after expanding the existing power plant with a turbogenerator of 1200 kW in 1910³⁸. Its board of governors was led by Walther Rathenau, and the direction of the company was retained in Berlin –only the operational management worked in Turku³⁹. This was the start of the AEG's direct involvement in the Finnish electricity utility business. In 1910, it also took over *Elektricitets- och gasaktiebolag Paul Wahl & Co* in Viipuri with its manufacturing plant, gas and electricity utilities. As in Turku, the AEG built an electrified tramway network in Viipuri under a concession agreement with the city council⁴⁰.

³⁴ Ekström (1958), pp. 27-28.

³⁵ This optional procedure resembled the case of the gas supply utility in the city. In Turku, the gas works were built and opened as a private company in 1861 until 1891, when the city council redeemed it. Ekström (1958), p. 8; Kärnä (1993), pp. 151-152.

³⁶ Ekström (1958), pp. 28-30.

³⁷ Ekström (1958), pp. 30-50.

³⁸ *Teknillinen Aikakauslehti* (1921), p. 317; Ekström (1958), pp. 51-59.

³⁹ Dr. Walther Rathenau (1867–1922) followed his father, Emil, as head of the AEG in 1915. Schultz (1908), p. 22; Ekström, (1958), pp. 25-44; Hughes (1983), pp. 179-80.

⁴⁰ *Kontrahti Viipurin kaupungin ja Berliinissä olevan yhtiön Allgemeine Electricitäts-Gesellschaftin välillä* (11.11.1910) (1932); Schultz (1908).

The companies taken over in Turku and Viipuri were among the four largest electricity supply utilities and among the three leading domestic installation firms in the country. Taken as a whole, the AEG's subsidiaries in Viipuri made up the second biggest employer in the city, the next only to the engineering works of the State Railways⁴¹.

In 1908 and 1913, the AEG also gained control of two other urban utilities in Hämeenlinna and Maarianhamina, the city on the island of Ahvenanmaa. In Hämeenlinna, the city council leased its utility to the AEG. In a short time span, the German multinational company became the most prominent private owner of urban electricity supply utilities in Finland. The AEG accounted for 81 per cent of the sales of the private urban electricity utilities and 22 per cent of the sales of all the urban electricity utilities in the country, as indicated in Table 3.

Table 3. The urban electricity supply utilities operated by the AEG in Finland in 1914

City	Year of establishment	Year of AEG's take-over	Year of municipalisation	Sales 100 kWh in 1914	Consumption kWh per capita
Turku	1898	1907	1919	2,797	52
Viipuri	1887	1910	1936	1,916	65
Hämeenlinna	1899	1908 ^a	1918 ^b		16825
Maarianhamina	1909	1913	1919	24	17
Total				4,905	
All urban electricity utilities	1884-1914			22,233	44

a The beginning of the AEG's leasing period.

b The end of the AEG's leasing period.

Sources: The Archive of the Board of Industry in the Archives of the Central Statistical Centre of Finland; The Archive of Strömberg Oy; *Teknikern* 1891-1918; various works in local history.

Takeovers of electricity supply utilities were significant parts in the AEG's strategy to sell its products. In the sales of DC and AC generators competition was very sharp at the turn of the 19th and 20th century. In contrast, the AEG succeeded fairly well in marketing its turbogenerators and tramway equipment, which presented novel and more challenging technology –not available for small or medium-sized engineering works.

⁴¹ Lyhyt kertomus yhtiön vaiheista vv. 1898-1923 (1923), pp. 3-6.

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World War I interrupted the rapidly growing influence of the AEG in Finland, while the wartime crisis accelerated the plans of city councils to municipalise the private electricity utilities in their area. A further pressure was directed on the AEG utilities because their main office was located in an enemy country. Consequently, during the war the Finnish government confiscated German property in its territory and put it under special control. In these actions, the government followed the policy of the Russian regime. Following the order of the Russian general governor, F. A. Seyn, the highest representative of the Russian tsar in Finland, the *Elektricitätswerk Åbo Aktiengesellschaft* was confiscated by provincial authorities as early as August 18, 1914. The operation of the utility was continued, but its Finnish general manager, baron Carolus Wrede and Swedish technical director, engineer Walter Schmidt were moved to lower ranking jobs, until they left the company. They were replaced by two local men. The director of the house of correction Vihtori Nybergh was nominated to the post of the commercial manager and civil engineer Ahlberg to the post of the technical manager. Immediately the new managers faced economic problems, when coal had to be replaced with more expensive firewood, inflation boosted also other costs up, whereas the rates of electricity remained stable until March 1917. The consumption of electric power increased but that did not make the utility profitable. Another change was that German discontinued being the official language of the company. From July 1, 1915, all documents, accounts and letters were to be written in Finnish or Swedish. The former German name of the firm was also changed to a bilingual form *Turun Sähkölaitos-Åbo Elektricitätsverk*⁴².

According to the Peace Treaty of Brest-Litovsk between Germany and Soviet Russia in March 1918, the confiscated property in the Russian territories was to be returned to its former German owners. As a result, soon after the Finnish Civil War of 1918 the confiscation of the Turku electricity supply utility was revoked and the company was returned under the management of the AEG. Technical director Schmidt returned from Sweden and a new general manager Bohnstedt also arrived at Turku⁴³.

In several cases, German owners were not keen to continue their business in Finland; in contrast, they were ready to sell their possessions in the new republic because of internal turmoil in the country and anxiety for the Allies' final decisions about German property in neutral countries, what Finland was after gaining its political independence in December 1917. In this respect, the AEG was not an exception; it was also willing to negotiate seriously on the sale of its utilities. In April 1919, the Turku city council redeemed the electricity supply utility and tramway service from the AEG's subsidiary in Stockholm. They continued to operate as a limited company, which was gradually municipalised⁴⁴.

⁴² Ekström (1958), pp. 63-75; Söderström (1990), p. 45.

⁴³ Ekström (1958), pp. 74-76.

⁴⁴ Ekström (1958), pp. 85-95 and 135.

4. Re-evaluation of Takeovers

To conclude, it can be stated that takeovers by the giant German company were a debated issue in Finland. In Turku, Viipuri, Maarianhamina and Hämeenlinna, it was considered that although the AEG had brought new technology and capital to local electrification, co-operation with the company did not fulfill all hopes. The prices of electricity sold to the municipalities and to the public were criticised as being unreasonably high⁴⁵. To be fair, one must state that the retail prices of the AEG utilities were quite close to the average electricity prices in Finnish towns and certainly not among the most expensive rates⁴⁶. At least in Turku, the city council regulated electricity rates deciding the maximum level of the retail rates per kWh⁴⁷. The AEG was also said to be an inefficient distributor of electricity, and too inflexible in its relations with the city councils and stiffer than Finnish private counterparts in other towns. Hence, three of the city councils (Turku, Hämeenlinna, Maarianhamina) were anxious to municipalise the utilities immediately, when the war ended. In contrast in Viipuri, the city council did not accept the terms of the AEG's tender and so the municipalisation of the very profitable utility in that city was postponed to a particularly late date, 1936; only the municipalisation of the private electricity supply utility in Kemi in Lapland came later⁴⁸.

The original agreement between the city council of Viipuri and the AEG resembled the common German-type concession of the agreement, the unreasonable consequences of which had to be restricted later by law, for example in Switzerland and Germany⁴⁹.

A clear conclusion is that in economic terms the AEG was very competitive in the fairly closed Finnish market, which was separated from the Russian one by a custom border. An example of peculiarities of the Finnish market is that neither for western companies was the access easy. Making direct foreign investment might be even more difficult than in Russia. However, there was also an interesting coincidence between the attempts of the Finnish government to facilitate electrification by reducing import tariffs on electrical equipment in 1897 and the penetration of foreign electrical firms into the Grand Duchy's market and the increase of electrical installations at the same time. Reductions of import tariffs enhanced the AEG's superiority furthermore. Causal relations seem to be quite evident between these phenomena. From the electricity producers' viewpoint, it was clear that after 1897 prices of electrical equipment were substantially lower

⁴⁵ *Teknikern* (1911) no. 729, p. 133.

⁴⁶ *Selostus Suomen kaupunkien sähkölaitosten virranhinnoista* (1915).

⁴⁷ The city council bought electricity for street lighting and its premises and got a price reduction of 10%. Schultz (1908), pp. 18-19; and Ekström (1958), p. 29.

⁴⁸ Ekström (1958), p. 79ff; Palme (1962), pp. 243-244; and Koskimies (1966), p. 385.

⁴⁹ *Historiikki Viipurin sähkölaitoskysymyksen tähänastisista vaiheista ja kertomus Viipurin kaupungin sähkölaitoksen ja raitioteiden toiminnasta v. 1936* (1937), pp. 1-8.

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than earlier, while the quality and capacity of the available machinery rose. Together these factors boosted investments in electrical technology.

One can, therefore, claim that the entry of foreign electrical firms accelerated the electrification in Finland. At least in the short run, electricity producers and consumers benefited from the sharper competition between the providers of electrical equipment. Bearing in mind the Finns' initial enterprising disposition, it is however not correct to claim that "it was Berlin that pushed Finland on the road to electrification," paraphrasing Guenter Holzer's statement about Russia⁵⁰.

Nor did Berlin become the capital of the Finnish electrical industry as it did that of the Russian counterpart. However, the German firms had, undoubtedly, a technological and marketing lead in electrical engineering, as the Russian engineer P. Gurewitsch pointed out in 1915 in a Swiss journal: "No other country could deliver at so low a price such a variety of electrical goods" as Germany⁵¹.

Fortunately, the intrusion of foreign electrical firms and products into the Finnish market did not crush the domestic electrical engineering industry completely, although the engineering works of Paul Wahl & Co, one of the biggest Finnish electrical engineering workshops, fell into the hands of the AEG. The activities of both the domestic electrical industry and the Swedish companies balanced the German involvement, and this fact prevented Finland from becoming completely dependent on the transnational companies of German origin.

The trend of the change was, however, threatening to domestic firms. Between 1895 and 1905, the market share of Finnish-made generators and electric motors dropped from about two-thirds to one-quarter, while their exports shrunk to a modest amount. During this process, Finland lost some part of its potential backward linkage effects but gained a considerable amount of forward linkage effects, which were probably more important for its national economy. The ideal situation would, of course, have been for the domestic electrical firms to have preserved a competitive level through this period of technological leaps and economic recessions, but that does not seem realistic if considered in an international perspective. At the turn of the century, a strong increase of German influence took place in the Finnish industry in general, as well as in academic and technical education, technical R & D, management practice and various technical norms⁵². Direct investments were a reflection of a prevailing trend at that time. In urban electricity supply utility business those investments were relatively larger than in any other sector of the Finnish economy.

Technically the electricity supply systems delivered by the AEG were applicable and up-to-date but they faced increasing resistance in Finland even before World War I. Main arguments against the AEG and other private electricity supply utilities included that compared to their Finnish counterparts they were not as communicative and co-operative, they charged higher rates and were reluctant to

⁵⁰ Holzer (1970), p. 90; Kirchner (1982), p. 412.

⁵¹ *Electrotechnische Zeitschrift* vol. 36 (29 July 1915) no. 30, quoted in Kirchner (1982), p. 420.

⁵² Myllyntaus (1996) and (2003).

expand their networks to suburbs of cities. The result was that all utilities operated by the AEG and other foreign electro-technical companies were municipalised in the interwar period.

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