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LONG WAY TO NATIONALIZATION. FOREIGN AND DOMESTIC ACTORS IN THE EARLY ELECTRIFICATION OF PORTUGAL (1922-1944)

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LONG WAY TO NATIONALIZATION. FOREIGN AND DOMESTIC ACTORS IN THE EARLY ELECTRIFICATION OF PORTUGAL (1922-1944)

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Abstract

Economic nationalism underpinned the Second Postwar Era of nationalizations of electrical sectors. Then, peripheral countries enjoyed an industrial surge along with electrification progress. This paper examines what had happened in the Portuguese electrification before the first step to "domestication" and nationalization in 1944. Then, cooperation between foreign and domestic operators with the Government made a great leap forward to the country's electrification. This intervention was based on the assumption that foreign companies had not been willing to fully foster the electrification of this poor country during the interwar period. The Portuguese case confirms that international holding-groups eventually determined the pace of adoption of this public intervention, but also claims that the responsibility for this state of affairs partly rested with the nationalistic policies on behalf of the Government.

Presentation

Since the recent opening of the black box of electricity sector nationalizations during the post-Second World War period, some factors unconnected with economic nationalism have come to light. The notion of electricity infrastructures as public goods and electricity markets as natural monopolies subject to regulation had been covered under this umbrella. The neo-institutional literature has highlighted, however, that the profits of international electricity companies had not always been extraordinary, even though they achieved market power. Their forms of entrepreneurship would have been adopted their profiles more for defensive than predatory reasons, in view of the inherent risk of their investments and, in short, the nationalization of the electricity sectors would not have taken place anyway, unless proposed by the foreign companies themselves. After the Great Depression, reduction in their profitability would have precipitated the demand for "domestication" and public intervention[2]. However, this thought-provoking hypothesis would require some fine-tuning, if the variety of rhythms and different aspects of the nationalizations are taken into consideration.

[1] Work in progress. Please, do not quote.
I would like to thank Fatima Mendes (*Museu de Electricidade*, Lisboa) and Nuno Madureira, *Lisbon University Institute*.
[2] Both approaches, in Millward (2004) and (2005), Cliffton, Lanthier and Schrörter (2011).

Participation in the global electrification of Portugal, a peripheral and poor country during the inter-war period, offers an interesting vantage point insofar as its electrification matched perfectly well the pattern of global electrification of Hertner, Wilkins and Hausman (2008). The Portuguese case, however, once again gives relevance to economic nationalism as an independent variable in little-developed peripheral country, and above all it makes it clear that market and company size were both important. Lisbon and Porto were two diverse markets supplied electricity by different generation procedures and by two subsidiaries of two very different-sized international holding companies. The difference in size might be as great as the difference in their capacity to influence the decision of public intervention, which was what provided the final impetus to the electrification of the country, from 1944 onwards.

Electrification was certainly a global process from the early stages in the last decades of 19th century up the 2nd World War, when the continuous worldwide transfer of technology and capital was virtually interrupted. In the European Peripheries, a marked electrification performance including the building up of regional markets went hand in hand with them becoming the recipient of large shares of international flows of capital during the inter-war period[3]. In the Southern periphery, e.g. Italy and Spain, the American holding-groups contributed extensively to fund the financial needs of some of the largest electricity supply systems[4]. In contrast, electricity markets in Portugal remained essentially underdeveloped until the second half of 20th century. The absence of a steady flow of foreign capital and entrepreneurship has been argued as a key factor for the backwardness of the Portuguese electricity sector, though the two main markets for electricity in Portugal i. e. Porto and Lisbon were being headed by foreign companies during these years. These firms showed no intention of leaving the country, but electricity lines hardly expanded beyond both city limits during those times. Both generating utilities and transmission lines supplied essentially local markets until the Government fostered an ambitious electrification project in 1944, the *Lei 2,002.* It was based on the collaboration amongst private companies in a scheme ordered and backed by governmental organisms[5]. The necessary economies of scale were only achieved when huge investments were made in dam-building and regional transmission lines[6]. Regardless the cooperation between foreign and domestic operators with the Government made it finally possible; this first step to Nationalization was based on the assumption that private companies had not been willing to fully foster the electrification of this poor country[7].

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[3] The process even intensified during the initial stages of the Great Depression Herter, Wilkins and Hausman (2008). European Peripheries, in Aldcroft (2006).

[4] Storaci and Tattara (1998).

[5] Madureira (2008, p.18).

[6] The peculiar endowment of water resources in Portugal required large works for water regulation. Bartolomé (2006). Market regulation at municipal level and rent-seeking behavior on behalf of both municipalities and supply companies also impeded achieving the necessary economies of scale in Porto's market. Bartolomé (2012).

[7] According to Teives (2011), energy prices were ultimately the key driver of this timing in the Portuguese energy transition, postponed until the fifties when electricity prices dramatically dropped.

This paper examines what had happened in the Portuguese electrification before the decided intervention of the Government in ruling its development. Firstly, this implies analyzing the reasons why markets in Portugal were almost neglected by the international flows of capital which drowned the Peripheries in the 1920s. A regional approach may shed some light on this topic, since this American wave of capital was diverted to exceptionally profitable markets and the Portuguese prominent electricity markets were likely to be lucrative but small. A view in the early implementation of nationalistic policies in Portugal during the early thirties may also clarify this point. Nationalistic policies might have obstructed electrification projects coming from abroad to prevent foreign capital from a major progress. Secondly, some attention is addressed to the foreign companies already settled in Portugal since they also deferred the transfer of capital at some point. On the one hand, the paper focuses on the small, the *União Eléctrica Portuguesa* (UEP); dependent upon the Spanish holding-group headed by *Banco de Vizcaya* through *Electra del Lima*. UEP operated in the Porto region and was eager to enlarge its insufficient demand with new lines to deliver energy to remote markets of electricity, but neither the Portuguese managers nor specially the Government would easily accept its crucial enlargement of the market. On the other hand, some attention is devoted to *Companhias Reunidas Gás e Electricidade (CRGE)*; the electricity company in Lisbon associated to a huge international holding-group, i.e. *Sofina*. Until late 1930s, CRGE had no need of building a regional market as thermoelectricity assured the company the best profitable records in a small but lucrative market like the city of Lisbon. In 1944, Portuguese electricity markets were certainly so narrow that the indispensable increase of scale of the supply sector would hardly come without the collaboration of a public operator. The Government was essential to guarantee the endeavor while the companies provided funds and technological skills. The Portuguese case confirms that foreign companies certainly determined the pace of adoption of this public intervention, but also highlights that nationalistic policies on behalf of the Government bear a great deal of the responsibility for this state of affairs[8].

This paper is divided into seven sections. Section one deals with the historical background of the early role played by Electrical holding-groups in the European Peripheries. Section two presents the case of the modest electrification of Portugal. Section three introduces the Governmental policies. Section four and five explores the evolution of UEP in Porto and section six that of CRGE in Lisbon. The paper ends with some final remarks.

1. Electrification as an international issue

[8] This article primarily relies on a previous research based on Electra del Lima, the Spanish provider of electricity to UEP, and also on an investigation focused on the electricity market in Porto. Here and there, the companies' internal sources have been enhanced with information from governmental bodies Centro Documentação Electricidade de Portugal (CD-EDP) in Belém, Lisboa.

Electrification as a global process has overlapped successive globalization waves during 20th century. In the Peripheries, electrification went hand in hand with the internationalization of electrical companies from its very beginnings to the 1940s. According to Hausman, Hertner and Wilkins (2008), foreign ownership and control of electric utilities was only resumed in the 1980s when market regulation loosened, but the internationalization of companies and holding-groups promoting electrification in the first decades of the 20th century was almost universal and so were the first and subsequent waves of international transfer of technology and capital.

In the early times (1889-1905), electro-technical conglomerates were responsible for the circulation of flows of the new inventions and machinery. The electric technology had flourished here and there, so competition was fierce among different groups, which pursued to impose their rights through patents and the application of the *Unternehmergeschäft* strategy. The pioneers were both British and American companies which settled down branches abroad since 1880 onwards. The main groups were the American *General Electric* and the European *Siemens-Schuckert,* and *Allgemeine Elektricitäts-Gesellschaft* (AEG), which constituted an independent branch of Edison for Europe. Here and there, electricity supply firms were created following a pattern of satellite companies and flourished in every single important city in Europe. This cycle finished as soon as did the battle of the systems and the expansion of the electrification of the cities was often left in hands of domestic entrepreneurs[9].

As of 1905, the financial requirements of the electrical industry grew enormously[10]. This process was closely related to the internationalization of electrical companies. The scale of the long-distance transmission lines, the electric utilities and the management of electrical systems were multiplied, as were their financial needs. More specifically, hydro-electrical firms were capital-intensive and this entailed a continuous and huge flow of capital. Hydro-electric assets were fixed and they could not be removed and used for other activities. Investing in hydroelectricity implied sunk costs and the investment did not yield any short term pay-backs. In addition, financial needs did not come to an end once the water-power systems were launched[11]. The electrical firms were involved in an endless process of absorbing not only intensive-consumers e.g. chemical industries, but also competitors, i.e. smaller electricity companies, so as to build regional monopolies. The role played by the international electrical conglomerates also included a sophisticated supply of human capital for building hydro-utilities and running electrical systems[12.]

[9] A review of the paper of these groups in Europe, Paquier (1998). The electrification of the European and peripheral cities, Doria and Hertner (2004).
[10] As Hertner (1986) and Segreto (1987) (1990) have shown.
[11] Turvey and Anderson (1979).
[12] Nelles (2003). Hertner, Wilkins and Hausman (2008).

Foreign investment in water-powered companies has emerged as particularly hazardous[13]. Firstly, as demand-elasticity of electricity abroad was unknown, the short-term returns of the business were insecure. Secondly, the companies attempted to keep under control the rates of foreign exchange of capital flowing in both senses. Pursuing to overcome all this trouble, American investors created companies ad-hoc and new financial tools. Thus, before the World War II, two main categories of companies were widespread by the internationalization of electricity firms, namely the operating and the holding companies. The financial institutions that supported these new firms were not investment banks, but financial syndicates and holding groups. For instance, the Canadian electricity syndicates, which stood for both abundant capital and electrical engineering capacities, backed the electrification of some promising manufacturing markets: the US, Brazil, México and Spain during the early 20th century[14].

During the 1920s, the usual imported components for building up a hydro-electrical system were the following: electro-technical equipment, the technical management of the hydro-systems and particularly large amounts of capital ready to be invested. However, some domestic expertise was also needed. The international electricity firms required local information on natural resources, authorization and license procedures, apart from a complete knowledge of energy demand. Finally, domestic advice was also essential regarding institutional lobbying and networking[15]. While local managers suffered from the constant pressure of costumers and local authorities in order to improve the electricity service, Neufeld (2008) conversely predicts that foreign investors were not confidence in the return of sunk costs[16]. Nelles (2003) has suggested the use of "the operating rate" (the income share devoted to supporting the operational costs) to gauge this relationship. The variations of this index may constitute a good indicator of the bargaining between the group of foreign investors and the local managers.

After the 1929 World Depression, most international electricity companies gradually lost their interest in expanding their investments abroad since new regulations on public service rates were implemented along with the augmentation of infrastructure requirements. An "indigenization" wave encompassed the unhurried took over of the majority of the assets of these international companies by public sectors. These events have been interpreted following arguments identical to those pertaining to the ascent of state regulatory bodies. According to *Public Interest* view, nationalization occurred because the nationalistic ideology in the post-second-war Era had advanced enormously among policy-makers: the market could not handle the provision of a country's basic infrastructure during the 2nd World War, when the shortages of fuel had put

[13] Nelles (2003).
[14] Hausman & Neufeld (2002) and Hausman & Neufeld (2004).
[15] Doria & Hertner (2004), Hertner & Nelles (2007).
[16] The need for utilities to obtain large investments in specific assets created appropriable quasi-rents, which impeded electricity companies to operate in competitive markets. Neufeld (2008, p. 1066).

strong pressure on the expansion of electric energy resources[17]. Nevertheless, the *Capture Hypothesis* posited that the companies even wished for it, as they had been suffering from diminishing returns of their investments since the early 1930s[18].

Regardless the electricity sector in Portugal fit fairly well the pattern of global electrification, electricity lines were still confined to the cities' limits and the regional markets were hardly developed in the early 1930s. Thus, fuelling new funds was needed to scale up generating infrastructures and transmission lines, but these investments were postponed until de 1950s after the Government intervention. In line with the *Capture Hypothesis*, foreign investors had not probably been confidence in the pay-backs of these new funds. Surprisingly, the electricity-group which suffered an earlier declining return on investment showed a greater willingness to expand their market by fuelling new funds. None of their initiatives was allowed by the government since administration rulers were likely to feel menaced by any foreign initiative. Let us follow this complex process with a view on the country, on the Government and on the two parallel paths: the evolution of CRGE in Lisbon and that of UEP in North Portugal until the 2nd World War.

2. The electrification of Portugal until 1944: partial and slow

By the end of the 19th century and the early decades of the 20th century, Portugal did not become a prominent destination of foreign direct investments. The absence of a steady flow of foreign capital and entrepreneurship has been recalled as the basic constraint for the expansion of both supply and electricity demand: generating utilities and transmission lines as well as industries linked to the intensive use of electricity as electrochemical and electro-metallurgy[19]. Despite the presence of a bunch of companies controlled by foreign holding-groups, electricity markets in Portugal remained essentially underdeveloped until the 1950s[20].

Portuguese's electricity markets were minute in mid-forties and these small markets were hardly connected until the Second World War (See Map 1). During the conflict, the companies were compelled to connect their networks, but the voltage of the lines was still remarkably low. In fact, the two electricity generating systems in the North were connected at 15.000 V in 1941 and 30.000 V line connecting Lisbon and Setubal was only placed in 1945, whilst 110.000

[17] Hertner, Wilkins and Hausman (2008), p. 226.

[18] Gas companies pushing state intervention, in Troesken (1997). Neufeld (2008) put that State intervention was also a solution to avoid corruption. Public and foreign operators in current developing countries, in Victor and Heller (2006).

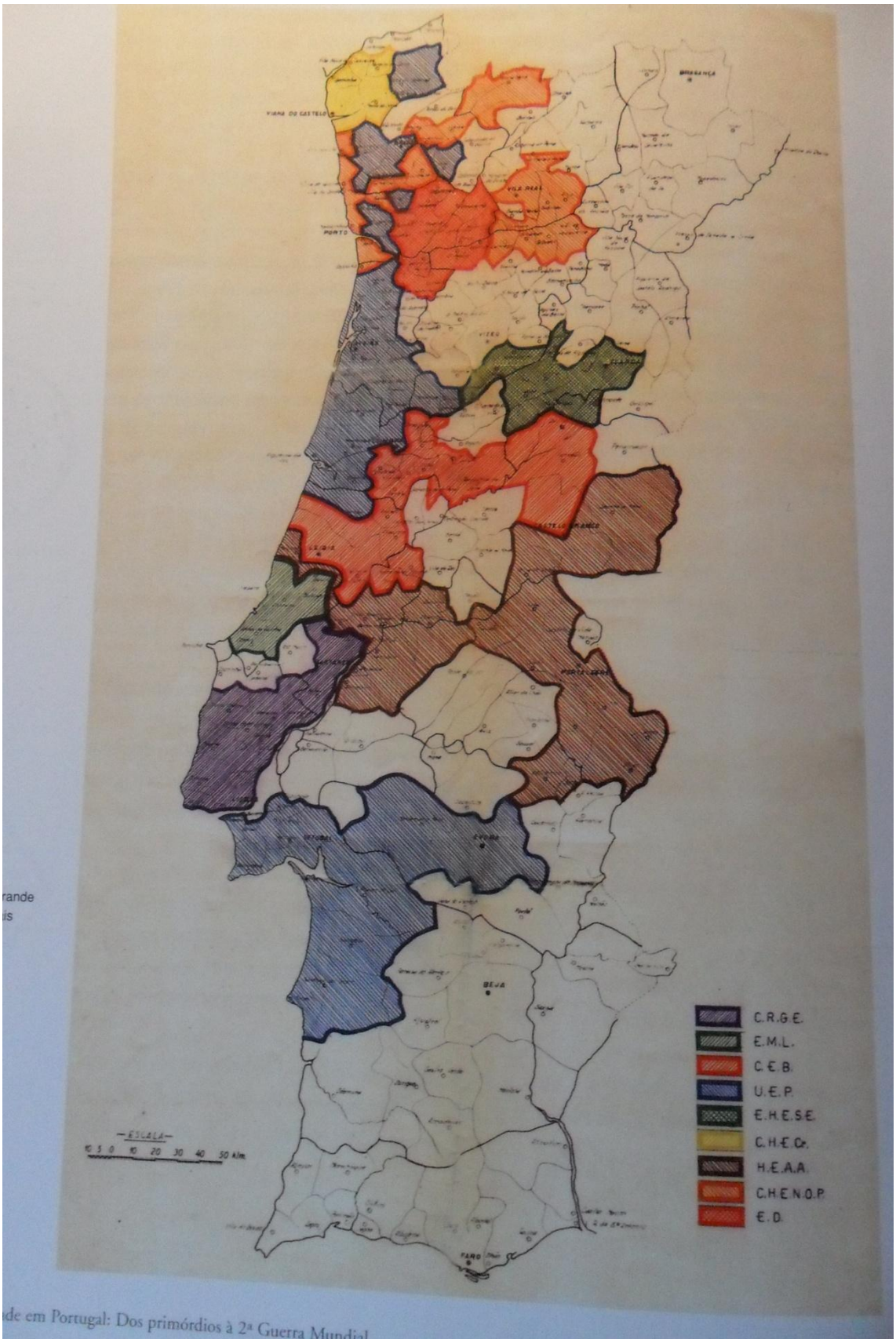
[19] The rate of investment in Portugal was extremely low, regardless increasingly higher before the Second World War, according to Freitas (2005), Table 3.1, p. 95.

[20] Electricity markets, Matos (2003b) and (2004). The development of the energy markets in Portugal, Madureira (2005). Madureira (2008) has stressed that the low rate of growth of the domestic market –i.e. the preeminence of the agricultural sector and the low level of urbanization—discouraged any potential investors during the interwar period. Recently, Teives (2011) greatly explains the Portuguese energy transition. Porto's electricity market, in Bartolomé (2012).

V's tension lines were commonly used in both Italy and Spain for transmission lines as of 1914[21].

Map n. 1. Companies' distribution areas in Portugal (1945)

[21] Portugal, in Matos (2005), p. 406, Table "Interligaçoes entre sistemas electroproductores". In Catalonia, connections from the waterfalls in the Pyrenees to Barcelona reached 110.000 V in 1914.



Source: AHME-EDP. Fundo Ferreira Dias.

Table 1. Electrical Utilities in Portugal (excluding self-production) in 1943 (Power Capacity in kW)

	Hydro Powered		Thermal Powered		Total	
Power in kW	Plants	Capacity	Plants	Capacity	Plants	Capacity
up to 20	6	58	21	319	27	377
21 - 100	16	836	61	3,138	80	3,974
101-500	14	3,736	25	6,000	39	9,736
501-1,000	6	4,464	7	5,201	13	9,665
1,001-5,000	8	23,171	1	3,250	9	26,421
5,001-...	4	56,824	6	121,046	10	177,870
Total	54	89,089	121	138,954	178	228,043

Source: Estatísticas das Instalaçoes eléctricas em Portugal, 1943.

Accordingly, most electricity plants were tiny in the early forties (see Table 1). Only ten electricity power-plants were over 5.000 kW and their total capacity did not reach 200,000 kW (see Table 2). In the 1930s, the *Iberian Electric Ltd*. sent a Memorandum to the Portuguese Government unfolding the characteristics of the domestic market[22]. According to it, electricity markets in Portugal were both tiny and scattered. This was the main obstacle for a better driving of its electrification performance. Each company had to adapt to a modest local consumption, obstructing the achievement of economies of scale (the capital invested per installed kW was very high as were the running costs). Reserve facilities should be maintained by each company in the absence of interconnecting lines. Thus, financial burdens were so high that made electricity service unavailable to many cities. Moreover, electricity retailing prices were remarkably high and industrial consumers, except some cases, were not able to afford commercial electricity and some manufacturers used self-generation. Thus, retailing electricity companies supplied essentially lighting, which had an extraordinary impact on the poor rates of performance of the electric facilities. As a result, electricity prices followed somehow electricity costs[23].

Table 2. Electric Systems in Portugal, 1940 (in kW)

System	Total Power Capacity	Spare Power Capacity	Maximum Capacity in 1940
CRGE	60,000	15,000	32,200
UEP-Sul	8,200	1,800	4,300
Alto Alentejo	7,400	2,300	3,800
Sierra da Estrela*	17,000	4,200	6,570
UEP-Varosa-Ermal	50,000	5,000	36,500
Carrís do Lisboa	13,200	3,800	7,600
Carrís do Porto	11,300		6,000
Total	167,100	32,100	

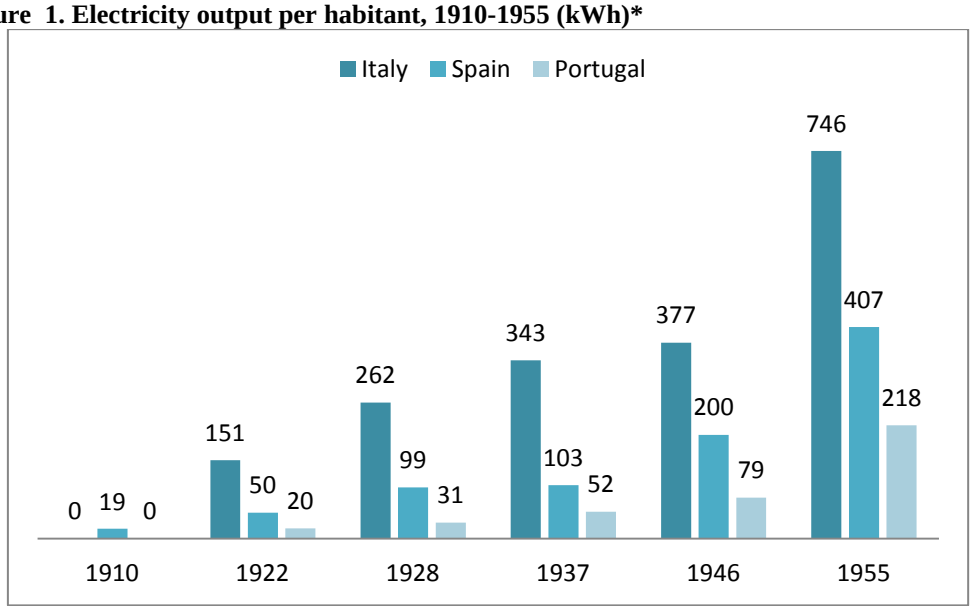
Source: CD-EDP: Fundo Ferreira Dias, 39, C1 P3.

[22] The *Iberian* was an American holding-group, participated by the *European Electric Corp*. and the Italian group *Volpi*. The first was linked to General Electric Corp. and the latter to *Sofina* as well. *United Electric Securities*, created in 180 was the first global financial holding-group. Hausman, Hertner y Wilkins (2008), p. 192, Segreto (1987), p. 895 y Hertner (1987), p. 831.

[23] *Iberian Electric Limited*. Montreal. Canadá. Relatório Geral e Propostas Preliminares para a Electrificaçao do Norte de Portugal. 2/04/31CD-EDP: Fundo Ferreira Dias. Direção dos Serviços Electricos. Repartição de Estudos e Construcçoes. FD. 26. C2P6.

Some other countries of the Southern periphery, namely Spain and Italy, had soon become the recipient of large shares of international flows of capital, firstly commanded by British firms and by German and American afterwards. Unlike Portugal, the possibilities of expansion opened by hydroelectricity in both Italy and Spain especially attracted American holding-groups during the interwar period. As can be seen in Figure 1, in these countries, water-power fostered an increasing electricity production during the last twenties. A marked electrification performance went hand in hand with a period of industrial prosperity between the wars. The so-called energy constriction Italy and Spain had endured during the 19th century was about to be overcome thanks to electricity[24].

Figure 1. Electricity output per habitant, 1910-1955 (kWh)*



Sources: Etemad y Luciani (1991) and Maddison: http://www.ggdc.net/MADDISON/oriindex.htm.
*Spain, 1937: Spanish civil war.

In Portugal, electricity output rose slowly during the first half of the 20th century. In 1940 reached 460.09 GWh, but less than 40 per cent were water-powered, whilst in both Italy and Spain hydroelectricity stood out above 90 percent of total output during the 1930s[25]. In Portugal, electricity output per head in 1935 was 50.52 kWh and industrial uses absorbed 26.24 kWh per habitant[26] and this consumption was particularly concentrated in two main Districts i.e. Porto and Lisbon[27].

The most dynamic markets for electricity in Portugal were essentially supplied by foreign companies through non-exclusive concessions granted by the

[24] A relevant global approach, in Hausman , Hertner and Wilkins (2008), particularly chapter 2 and 3. Giannetti (1993) for Italy and Sudrià (1997) and Bartolomé (2007) for Spain. Some remarks on foreign financial procedures, in Bartolomé (2014).
[25] Portugal, Estatísticas (1940).
[26] In Spain, industrial consumption was 72.54 kWh per inhabitant and total consumption was 148.30 per head, in 1935. Bartolomé (2007) and Nicoláu (2005).
[27] Madureira (2007).

Municipalities after open-tender procedures. In 1913, *Sofina* had acquired a significant share of capital of the Lisbon's company, i.e. CRGE, and Porto was served with electricity by UEP as of 1923. Regardless having been constituted in Portugal, both firms acted as being *free-standing companies.* Created in order to operate only in Portugal, the management of the businesses was kept in hands of the foreign investors in Paris or Madrid respectively. These two companies might have acted as means for diverting the crucial flows of foreign funds to Portugal. However, no regional markets for electricity were accomplished since companies' lines did not go far beyond the narrow boundaries of both cities. Electricity prices maintained high in both cities as the level of electricity costs did[28], since companies relied on irregular consumers, i.e. lighting and light manufacture. Thus, the main electricity markets in Portugal maintained narrow and in the remaining of the country electrification seemed poor, in a similar level to those pertaining to peripheral countries before the 1st World War.

According to the governmental bodies' version, having noticed the enormous backwardness, the Portuguese government guided a project of electrification as of 1944 (Decree 2 002) which planned an important hydro-electrical endeavor by stimulating both the supply and the consumption of electricity[29]. During the fifties, Portugal started a process of electrification catching up ruled by the State, which also favored an unhurried process of "indigenization" of the foreign companies of electricity at work in the country, which lasted until 1980s.

3. Portuguese Government and electricity markets before 1944

The electricity sector was left to the ruling of Municipalities in Portugal until 1926[30]. The City Halls were responsible for granting and extending concessions of electricity service. In return, the companies should provide the Municipalities with free-of-charge services of street lighting. Thereafter, the *Lei dos Aproveitamentos Hidráulicos* and the *Lei da Rede Nacional* inaugurated a new phase in state intervention[31]. The government negotiated a significant loan abroad in January 1927[32]. Although the expected foreign loan was never obtained, the hope of the implementation of a major electrification plan was encouraged in 1931 when Decree nr. 20,225 declared the government's intentions to intervene

[28] Return on investment was also high since a loose market regulation was applied. Porto, Bartolomé (2012). Lisbon, Bussola (2012).

[29] Ferreira Dias (1945).

[30] In 1912, the earlier legislation was the "Regulamento de Instalações electricas". Government control went back as far as 1921 through a representative on the Board of Directors of UEP. A Government Delegate was present from 1925. BD-UEP: 03/13/1925. CRGE, Bussola (2012).

[31] *The Lei dos aproveitamentos*, 20 October 1926 and *Lei da Rede Nacional*, 1927. This legislation coincided with the *Congreso Nacional de Electricidade*, 20-22 November 1926. Campos (1938), p. 120 and Matos (2004).

[32] In Porto, this legislation overlapped with the municipal project of exploiting water powered electricity in the national Douro in *Bitetos*. in 1930, 18,163 Decree of *Diário do Governo*. UEP point of view in Board of Directors Minutes (BD-UEP) 04/23/1930.

in the electrification of Portugal[33]. The new legislation essentially opened a tender after two strong proposals were received from *Iberian Electric Limited* and the *Westinghouse Electric International Company*[34]. When the tender was closed in January 1932, there were eleven proposals from manufacturing and electric-conglomerates all over the world, comprised one from Porto's UEP. A group of Swiss companies won the tender although the Government's lack of capital was argued as the origin of the project's suspension. In 1933, the attention was focused on the River Zêzere and a new proposal arose from *Westinghouse* -- the Anglo-American group—to invest there with the support of *Sofina* in Lisbon's CRGE, but it was similarly rejected by the engineer on charge of *Junta de Electrificaçao*, Ferreira Dias[35].

Thus, from 1926 onwards, companies and municipalities regarded the forthcoming state intervention as the main variable of future electrification. Nevertheless, nothing was effectively done until the 2nd World War. Both companies and municipalities linked the future of electrification of Portugal to the plans of the Portuguese Administration. Since the central Administration project was delayed twenty years, Municipalities and electricity companies had a poor stimulus to enlarge their systems over this period, particularly hydro-powered ones. New facilities implied substantial funds, whilst their municipal concessions were extended without improving the old agreements so that they would fit the forthcoming market settings.

Great changes came with the rise of coal prices during the 2nd World War. In the transmission cycle, the interconnection of the power stations of northern Portugal was ordered in June 1943 to save on foreign coal and maximize the use of the available hydroelectric power[36]. At the generating level, in 1944, the *Lei 2,002* finally implemented Salazar's plans for the electricity sector. It was based on the collaboration between companies and the government in an electrification process ordered and planned by government organisms[37]. The clauses were rigid but this meant the existence of a consistent plan which transmitted confidence to potential investors. It consisted of the establishment of new companies, namely *Hidroeléctrica do Cávado* and *Hidroeléctrica do Zêzere*, to exploit large-capacity hydroelectric power stations on the Zêzere and Cávado-Rabagão rivers, following a joint venture model, financed by public and private capital. In 1947, a new company, *Companhia Nacional de Electricidade* (CNE), was also founded[38]. After years of remaining standstill, the collaboration among foreign and domestic operators with the state made the progression in the electricity sector finally possible and the take-off of the electrification in the whole territory of Portugal would take place. As Madureria (2008) posited, the hard version of electrification, ruled by the state, succeeded in achieving its goals in a climate of increasingly governmental enpowerment. The Government was seemingly

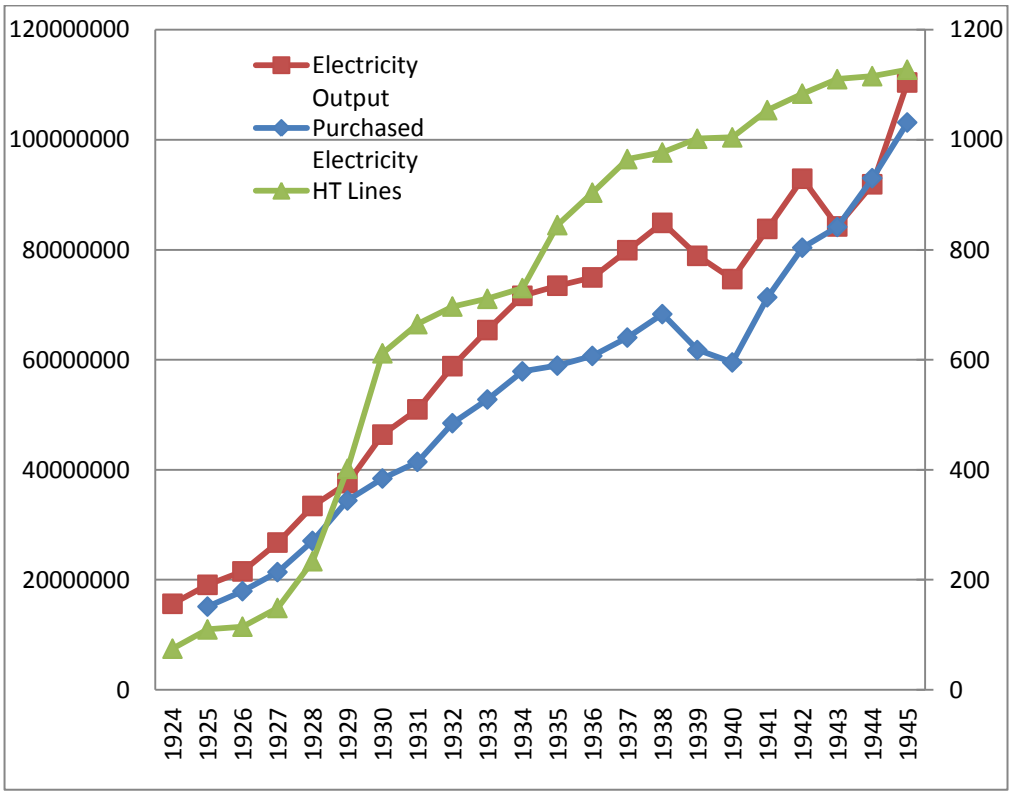
[33] The decree of 13 August 1931, edited in the *Diário do Governo* on 17 August 1931.
[34] CD-EDP: FD C5P7.
[35] 21 August 1933, CD-EDP: FD 28 C4P4.
[36] Order of 7th June 1943 (and the subsequent Decree No. 33.672 of 26th May 1944).
[37] Madureira (2008, p.18).
[38] As Madureira (2008, p.14).

leading the whole process since the companies' initiatives were all rejected until 1944. However, this process remained far from straightforward.

4. UEP in the North: water power in an insufficient market

The Spanish hydro-electrical group, headed by the *Banco de Vizcaya* pursued to accomplish a role of electricity promoter in North Portugal, taking charge of the building up of the *Lindoso* fall since 1916. This hydro-electrical group had at disposal both capacities: capital and some experience in engineering tasks. *Electra de Lima* had been planned in 1908 to supply electricity to the Porto region, but it was not until 1921 it obtained the concession for an electricity HT line from *Lindoso* to the city[39]. *Lindoso* was located in the river Lima, near the Spanish border, and this water-fall was the company's main asset[40]. The *Vizcaya's group* was also able to mobilize a Portuguese Bank, which actively participated in the promotion of UEP, the distribution company in Porto Region.

Figure n. 2. UEP in the Northern Market: Electricity Output and Transmission Lines (Electricity, in kWh on the left; Lines, in Km on the right)



Sources: Board of Directors: *Annual Reports. Lima* (1924-45) and UEP (1924-1945).

Freixo, a thermal utility in Porto and UEP's main asset, was planned in 1925 and inaugurated in 1928[41]. Some transmission lines were also placed –from *Lindoso*

[39] *Lindoso* was planned by Antonio Grasset and purchased in 1919 to the Vizcaya's group. The line's concession was granted on September 15, 1921. AHISA-Iberdrola. *Notas sobre la Historia de la SA. Electra de Lima.*

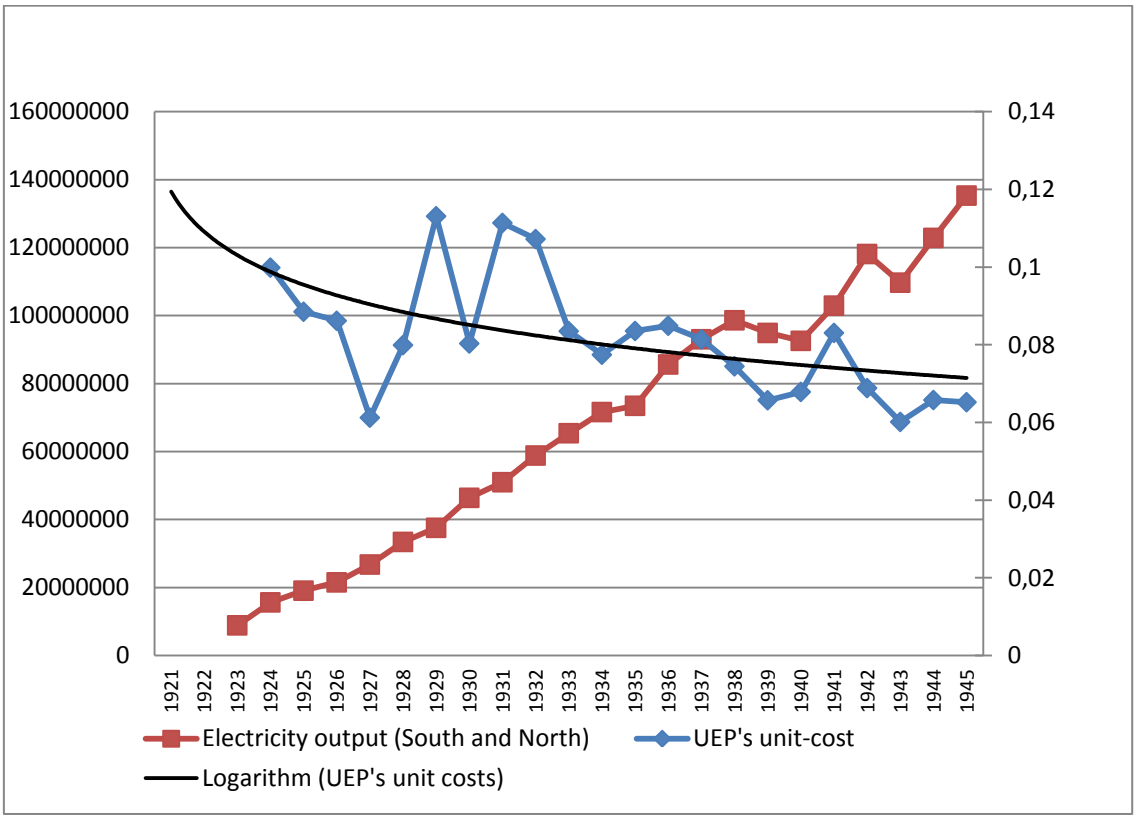
[40] *Lima* as a Spanish initiative in Portugal has been depicted in Bartolomé (2009).

[41] Sampaio (2008), p. 83.

to Braga, Porto and Coimbra—and in 1933, UEP also started buying a company in the Setubal Peninsula, the *Sociedade de Electrificaçao Urbana e Rurale* (SEUR) and the process finished in 1941. The firm followed an extensive pattern of expansion: raising the demand for electricity was only possible by means of an expansion of transmission lines. As can be seen in Figure 2, the pace of growth of the UEP's electricity output fuelled to North Portugal was similar to the expansion of HT lines, but networks grew faster than electricity before 1938[42].

As can be seen in figure 3, the augmentation of UEP's electricity output went hand in hand with a reduction in unit costs, but this decrease was never dramatic. UEP served minute markets with hydroelectricity obtained in a small waterfall and when they interconnected with other markets and generating plants by a grid in the late 1930s they were also minute markets served by small waterfalls as well.

Figure n. 3. UEP's electricity Output (kWh) and unit costs of Electricity (cents of Escudo)



Source: Appendix. Table 3.

Certainly, once the inner Porto was electrified, the expansion of UEP depended upon the building of a regional market for electricity in North Portugal[43]. This stood for the acquisition of water resources in order to enlarge the availability of energy when necessary, the purchase of a portion of the capital stock of the rival

[42] The available electricity (included *Lima* and *Freixo*) grew at 11.57% in the whole period (1923-45), while the lines increased at 13.11%. Between 1924 and 1938, the differences were remarkable: the lines expanded at a rate of 18.66% while the electricity increased at 15.14. Figure 2.

[43] Porto, included the total District, was a small city and the electricity output from *Lindoso* was clearly excessive from the late twenties onwards. Bartolomé (2012).

companies and, finally, market agreements. Unfortunately, this market-building policy ended up with a total failure.

UEP was never very successful in the first step of that strategy of expanding the market by obtaining licenses for the exploitation of water-resources in North Portugal. The earliest attempt involved the Cavado-Rabagão streams. In 1906, the company *Viação Electrica do Porto* had got a concession in this area, comprised some water-falls near Porto[44]. In 1920, these water-authorizations belonged to the *Companhia das Quedas de Agua do Norte de Portugal* and one fifth of it was maintained in the hands of the Portuguese Administration[45]. The UEP intended to purchase the concession but this proved difficult[46]. UEP only participated in *Quedas* in 1933 when UEP controlled the *Sociedade de Minas de Borralha* at the time as the Portuguese Government was expected to initiate a full electrification scheme in Portugal[47].

The Douro basin was the second alternative for increasing the *Lindoso* hydroelectric system[48]. In 1931, the company acquired the concession – International Douro-- which the Spanish Group had obtained by means of *Sociedad de Electrificación Industrial*. When this company was liquidated, UEP was offered and accepted the authorization although it was never used[49]. UEP applied again to the Portuguese Government, but in a different region: they asked permission for exploring the possibilities of the River Ocreza in the Tagus Valley in 1941; though it was assigned in 1945 to another company: *Companhia de Electricidade do Alto Alentejo*[50]. Finally, UEP was also overlooked when the most important waterfall concessions were distributed as the public initiative increased i.e. *Bitetos,* in the Portuguese Douro[51]; and the River Zêzere in the Tagus Valley[52].

In addition to the plans to accumulate hydraulic resources, UEP specifically sought to control some electricity markets in the North as the second step of their strategy of expanding the electricity market. UEP firstly attempted to get rid of

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[44] Matos (2003 b), p. 108. The actual exploitation of the waterpower in Portugal, see Simões (1997).

[45] In 1920, the company was represented by the Portuguese Bank, *Burnay Lda*., which stood for the interests of the *Syndicat Hydroelectrique du Nord du Portugal*, where the British Vickers Company was mainly represented. Campos (1922), p. 174 and Campos (1938), p. 98 and p. 161.

[46] In 1927, Motor-Columbus controlled both the project and the company and they wanted to renew the license again. BD-UEP: 02/28/1920 and Accounting Committee (AC)-UEP: 09/09/1920. Also, in UEP G4.2.1-4. Campos (1938), p. 174.

[47] *Borralha* retained 27,746 shares of the *Companhia das Queda's de Agua do Norte de Portugal* . The aim of this purchase was the *Sociedade de Electricidade Urbana e Rural* (SEUR). BD-UEP: 09/19/1933.

[48] To my knowledge, there were two attempts to acquire control over coal extraction companies in the Northern: in 1922, according to Campos (1938), p. 92; and, in 1927, when the company was about to sign a contract with the *C. Financiére des Mines*. BD-UEP: 07/09/1927 and 09/07/1927. There was also an attempt to agree with another company to obtain hydroelectric resources: *Saltos de Cabrum.* BD-UEP: 04/01/1930.

[49] Burnay was also involved in the business. BD-UEP02/05/1931. The exploitation of International Douro was technically complex and extremely expensive. Bartolomé (2006).

[50] BD-UEP: 07/18/1941 and BD-UEP: 01/17/1945.

[51] Campos (1938), p. 161-162 and BD-UEP: 10/31/1929.

[52] Up to 1937, Zezere was under the control of *Viaçao Electrica do Porto*, which then stood for *Sofina* in North Portugal. FD 29-C5-P7. The news of the expiry of the water-authorisation in FD 41-C4-P1

competitors by means of taking control of its rivals, but as this policy was not successful, UEP had to reach market agreements.

UEP started serving the Municipalities of Braga and Vilanova de Gaia in 1920[53] and in 1927, UEP's lines reached Coimbra and a contract was signed between the City Hall and the company until 1940[54]. In 1923, the lines had reached the main market, the city of Porto and the first contract was signed between the *Serviços Municipalisados de Gás e Electricidade de Porto* (SMGE) and UEP. This granted the UEP's exclusive control over the provision of hydroelectricity to this city. From the beginning, in the early 1920s, the UEP had to deal with a segmented electricity market in the city of Porto. The firm had to share this market with SMGE, which had exclusive retailing rights for any customer under 50 kW of capacity, and also the tramway company; *Companhia dos Carrís de Ferro do Porto*[55]. However, the struggle began in 1925, when the UEP's privileges were strongly threatened by the *Companhia Electrica de Varosa* and by the *Companhia Electro-Hidraulica de Portugal* (CEHP)[56]. UEP attempted to control CEHP by negotiating with *Varosa*, but following the breakdown of negotiations, Varosa and CEHP ultimately merged and became *Companhia Hidroelectrica do Norte de Portugal*, CHENOP, and this improved their power to bargaining with its main competitor in the City of Porto, UEP[57]. Thus, UEP had to adopt a new policy of market agreements. Firstly, UEP and Varosa signed a six-year contract in 1931 for the distribution of electricity in the Porto region[58]. Secondly, the three companies –Varosa, CEHP and UEP-, endorsed the third contract for the city of Porto in 1938[59].

Meanwhile, UEP had made a concerted effort to approach the Lisbon market and asked for authorization to study the placing of a HT tension line from Coimbra to Alcobaça in 1932, but the administrative process was promptly interrupted by the Central Administration in September[60]. Provided the approach to Lisbon was not granted from the North, UEP attempted to acquire SEUR, the company in the

[53] The news of the contract with these municipal services in: BD-UEP: 02/26/1920 and BD-UEP: 10/23/1920 respectively. The contract with Braga was renewed in 1925: BD-UEP: 05/22/1925.
[54] The concession of the HT line from Porto to Coimbra to Santo Tirso took place on 07/27/1928, in CD-EDP-UEP- G4 24-10. The contract between UEP and Coimbra's City Council in CD-EDP-FD 28-C4P1. This attempt to participate in the capital of competitors was only successful in the case of the small *Companhia das Beiras.* UEP participated in the capital increase in 1938 and 1941. BD-UEP: 10/06/1934. BD-UEP: 06/16/1938 and BD-UEP: 05/16/1941. There seemed to be another attempt to participate in other company in 1939: *Serra de Estrela*. BD-UEP: 11/10/1939.
[55] UEP signed a mutual-help agreement with *Carrís* in 1931 which was still valid by 1939. 09/19/1931 CD-EDP: UEP G4-2.2-3.
[56] BD-UEP: 09/05/1925. The warning became a real difficulty to monopolize the market when *Varosa* signed an agreement with the town of Espinho in 1927. CD-UEP FD 28-C4P1.
[57] *De facto*, CHENOP started to play its role in 1938, but became a company, *de iure*, in 1943, when the utility in the river Ave, N. Senhora do Porto was about to be inaugurated. Matos (2003 b), p. 121 and p. 170; BD-UEP 03/26/1943. Bartolomé (2012).
[58] The contract in CD-EDP: UEP G4-223 and references in BD-UEP: 04/25/1931.
[59] In extenso, Bartolomé (2012).
[60] The appeal in BD-UEP: 06/19/1932 and CD-EDP: UEP G4-2.2-3.

Setubal Peninsula south of Lisbon[61]. SEUR became part of UEP in 1941, but the project for a joint company network never materialized. During the 2nd World War, the UEP had to sign market agreements in the South with *the Companhia do Alto Alentejo* for the distribution of the electricity in Evora[62]. In the North, new circumstances made UEP and their competitors interconnect their grids; the shortage of fuel led to a compulsory integration of the networks in order to make the system in the North more efficient[63].

To sum up, during the interwar period, UEP clearly intended to build a regional market in the North of Portugal centered in the city of Porto. This was demonstrated through the attempts of capturing energy resources, the absorption of adversaries and market agreements. By 1938, this policy did not work as expected. The firm's future was menaced by two circumstances: no waterpower alternatives to the uneven production from *Lindoso* and the diminishing share of the electricity market in the city of Porto. Let's see whether the internal evolution of the company may shed some light on these aspects.

5. UEP: a small and water-powered semi-Portuguese company

UEP had been founded in 1919 as a joint venture of *Electra del Lima*, the Vizcaya's generating company in North Portugal, and a Portuguese counterpart, headed by *Banco Pinto e Sotto-Mayor*[64]. UEP, as a semi-Portuguese company, was in charge of transforming and delivering all the energy generated in the waterfall of *Lindoso* to the Northern markets. The *Banco de Vizcaya's* electricity holding-group was not used to organizing the exploitation in a vertically integrated structure. The corporative strategy developed in some Spanish markets segregated the generating and distribution cycles into two different companies, controlled by the generating one[65]. Similarly, UEP was set up to distribute energy to the Northern urban markets using Iberian capital and entrepreneurship, but ruled by *Lima*[66]. Thus, UEP was registered in 1919 in Portugal as it was supposed to pave the way for acquiring licenses and authorizations when necessary.

Regardless the initial attempts on behalf of the Portuguese and the Spanish group in order to preserve a good partnership in the UEP's Board of Directors, the relationship among them was far from easy since the early times. The two Iberian partners held exactly the same stakes of the capital stock until 1945 even though it was increased four times (See table 1 in de Appendix)[67]. The Spanish group

[61] UEP purchased 9,875 shares of SEUR, capitalized only at 30%. BD-UEP: 09/19/1933.
[62] BD-UEP 11/13/1942.
[63] BD-UEP 03/26/1943.
[64] *Pinto e Sotto Mayor* was formed in 1914. Câmara (1989).
[65] The corporative strategy of the group, in Anes (2006).
[66] UEP was founded on March 29th, 1919. The capital stock was 5 million Escudos. It was the biggest company in North Portugal. CD-EDP-UEP. Escritura.
[67] The capital increases were as follows: 12/07/1926: 20,000,000 escudos; 03/27/1928: 34,000,000 escudos; 06/11/1929: 40,000,000 escudos;12/23/1941 50,000,000 escudos. Estatutos UEP. CD-EDP-UEP. Estatutos.

and *Pinto e Sotto Mayor* were each responsible for selling their part in their own country and the Board of Directors was formed by an equal number of Portuguese and Spanish members[68]. The positions of President and senior managers were held by Portuguese members and the Vice President, who was essentially the firm's decision-maker, was Spanish[69]. There may only be some differences in the distribution of the securities issued by UEP, because the Portuguese Government was opposed to Spanish capitalists controlling a great portion of them[70].

Since the early times, constant disagreement among the two groups arose from the amounts to be paid to *Lima* as energy bills and the need for new investments. UEP was constrained to supply Porto exclusively with energy from *Lima*, although UEP was responsible for building a backup thermal power station i.e. *Freixo* and for maintaining the voltage of the whole electrical system. According to the Board of Directors Minute, the water-powered energy should be paid to *Lima* in golden currency and the retail prices would be fixed by agreement between the companies. Conversely, *Lima* would support UEP in case of competition with other distributors. Energy prices were initially determined in 1922 when Lindoso was about to deliver electricity to Vila-nova de Gaia[71]; however, in 1925 the Portuguese group attempted to change prices for the first time and an energy contract between UEP and *Lima* was signed in 1926[72]. When the Great Crisis triggered adjustments in the currencies that affected the payments to *Lima*, and in 1932 some changes in the price of hydroelectricity in relation to steam arose, *Lima* had to propose new procedures to compensate UEP though the divergences persisted until 1940[73].

The strategy of financial investment was the second source of rivalry between the Portuguese' and the Spanish' group. According to UEP's sources, *Lima* was initially in charge of a significant share of the financial launch of UEP. Therefore, *Lima* –and the group of Spanish banks that supported the firm-- provided considerable loans to UEP to avoid any increase in the capital stock[74]. However, starting an electricity company was frequently difficult as the 1924 UEP Assembly of stockholders revealed. The Portuguese group, which had not handed out any return on investment since 1919, expressed their lack of confidence in the electricity business and particularly in the Spanish managers. Apart from that, Vieira (from the *Bank Pinto e Sotto-Mayor*), the UEP's manager,

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[68] In May 1934, Carlos Barbosa, President of UEP, declared in a letter to the Ministry of Public Works and Communications that each group had an equal share. CD-EDP-FD C5 P7.

[69] César de la Mora was Vice President from 1925 until his death in 1937 and somehow maintained authority over strategic decisions.

[70] The first issue of bonds was in British currency, but the successive calls were in Escudos. According to the company sources, we ignore how the bonds were distributed. BD-UEP-05/23/1930.

[71] BD-UEP-02/28/1922.

[72] BD-UEP-07/01/1925.BD-UEP-06/26-1926.

[73] BD-UEP-02/24/1932. BD-UEP-05/01/1935. BD-UEP-02/22/1937. A new draft bill was accepted in BD-UEP-02/02/1940.

[74] BD-UEP-01/07/1925.

had recently left the company what made some suspicions aroused among shareholders. Actually, the holders were right because Vieira had committed fraud in October and left the firm without a trace. Thereafter, the company started distributing some dividends and this put an end to problems with the Assembly[75].

The disputes in the Board of Directors were compounded by the urgent increases in capital investment after 1925. Most of the investments were proposed by the Spanish group (i.e. generating facilities, *Freixo*; HT transport lines and the purchase of SEUR), but the Portuguese group felt these acquisitions threatened the UEP's forthcoming returns[76]. This was particularly so between 1924 and 1930 when a bank crisis in Porto coincided with a drop in the company's initial paybacks thus making it difficult to gain the confidence of domestic investors. Thus, UEP's investments were all faced attempting to avoid the conflict between the groups. As the loans offered by the Spanish banks were considered very expensive by the Board of Directors, the UEP's assets were financed by capital stock increases from 1925 to 1929[77]. According to the Board of Directors Minutes, the company chose an alternative means of raising funds after the Crash in 1929, and the state of affairs in the capital markets, and in order to avoid the rise in Portuguese industrial taxes: bond-shares. The UEP issued four securities series in British currency between 1931 and 1934[78]. Thereafter, the subscriptions were in Portuguese currency and the rate of return was significantly lower. Thus, the main purpose of these contributions (between 1936 and the outbreak of World War II) was to redeem the heavy charge of the high interest rate of the previous series[79]. After the purchase of SEUR in 1941, there was yet another increase in stock capital[80].

Despite the background of divergences among the two Iberian groups during their early years, UEP followed a coherent investment policy. On the one hand, the enlargement of the company's assets was financed by the increase in stock capital in three phases: the launch of the company, the building of *Freixo* and laying of transmission lines, and the purchase of SEUR. On the other hand, bonds and loans solved the company's short-term liquidity problems[81]. However, the rhythm of expansion of the firm was significantly slower than the rest of the Spanish hydro-group[82].

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[75] General Assembly- GA-UEP-04/30/1924. Accounting Committee-AC-UEP-10/20/1924.

[76] BD-UEP: 07/01/1925; BD-UEP: 09/24/1927; BD-UEP: 12/22/1931.

[77] The stock was increased three times up to 40 million Escudos. BD-UEP-12/31/1928. See Appendix, Table 1.

[78] Bond-Series in British Currency: 1st: 200,000 at 7% in BD-UEP 01/03/1931; 2nd: 21,000 at 7.5 in BD-UEP: 06/06/1931; 3rd: 50,000 at 7.5% BD-UEP 07/09/1933; 4th: at 6.5 BD-UEP 12/15/1934.

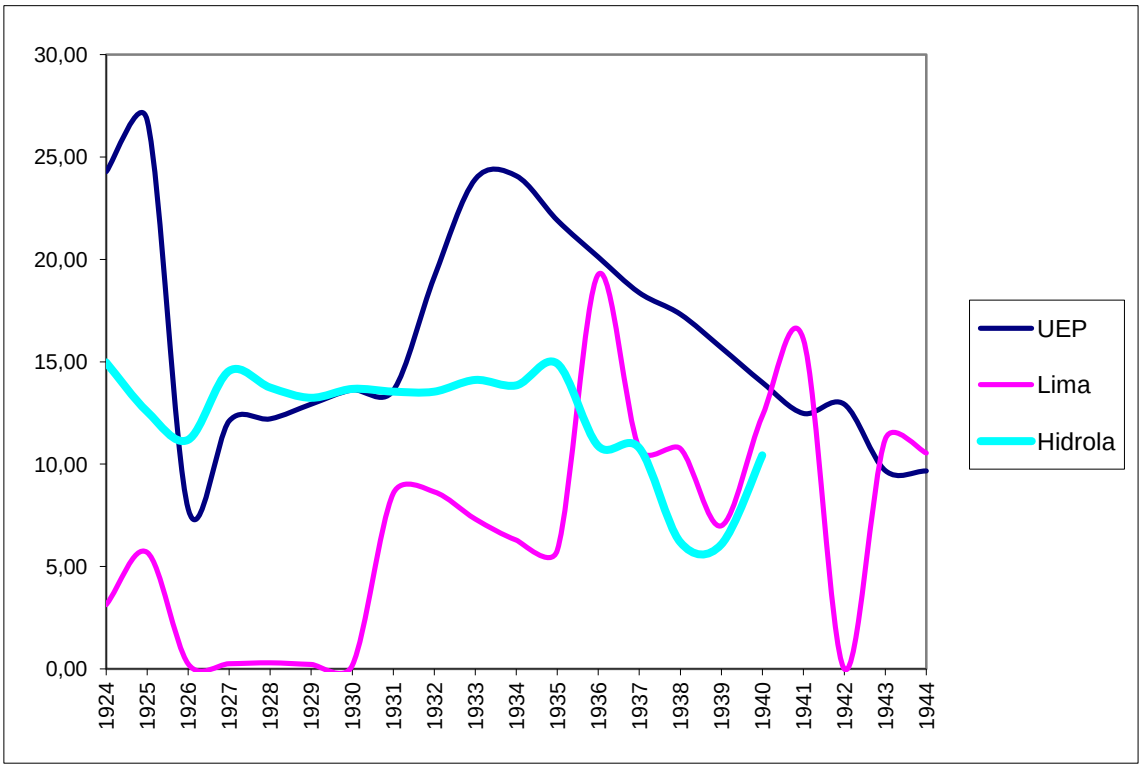
[79] First: 100,000 escudos at 5 %. BD-UEP 02/27/1936; BD-UEP 12/14/1936. The redemption of the previous series at 7. 5%. The total amount of the redemption was 15,000,000 escudos, but the President suggested issuing only securities series for this amount at 5% because it was a favorable moment to sell. BD-UEP 06/16/1939: Redemption of securities series at 6.5%.

[80] CD-EDP. Fundo UEP. Estatutos.

[81] Loans were requested during the launch of the firm and 3 million escudos in 1935 to *Lima* and Pinto e Sotto-Mayor at 4.5 %. BD-UEP: 10/9/1935.

[82] While the rate of growth of the output of *Lima's* group did not reach 14 % in the first 22 years of business, *Hidroeléctrica Ibérica* in the Vasco Country was almost 20% in the same period of time. Antolín (2006), p. 175 and Bartolomé (2009), p. 136.

Figure n. 4. Return on Investments (ROI): *Electra de Lima, Hidrola*, UEP (%)



Sources: Source: UEP and *Lima* Board of Directors: Annual Reports (1924-1944).

The lack of confidence in the firm on behalf of the Portuguese group was not rooted in their poor results. The UEP budgets and accounting-reports do not reveal any significant liquidity and solvency problems and struggles were refunded by loans and securities[83]. The UEP figures prove the firm's stability and resilience during this period. The firm's rate of return on equities was especially favorable, although barely diminishing since 1933[84]. Figure 4 compares the Return on Investment (ROI) of two generating companies of the same group i. e. *Hidroeléctrica Española* (Hidrola) and *Lima* and UEP. The ROI of *Electra de Lima* was significantly lower than the other generating company, *Hidrola*, and its evolution was uneven whilst UEP's pace of growth improved greatly like that of some of the retailing companies of the eastern *Hidrola's* market (See Figure 5).

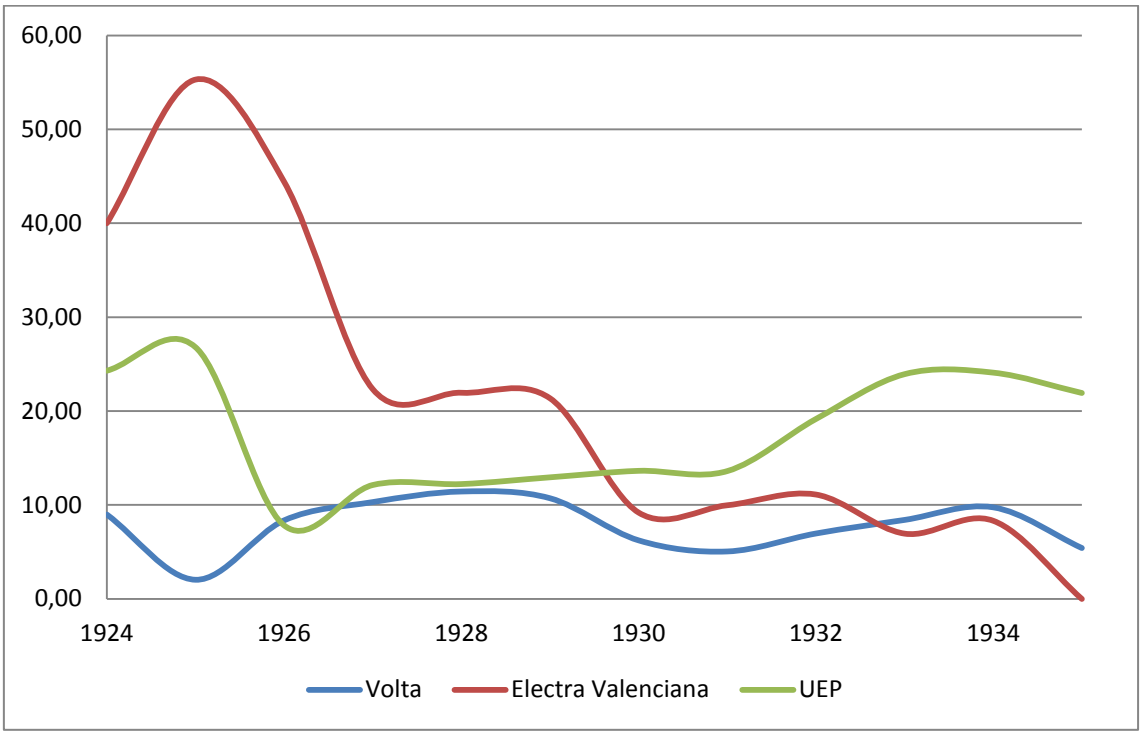
To recapitulate, the Portuguese partners proved to be uncomfortable with being got aside of the UEP's decision-making and with the return on their investments, always being lower than their traditional commercial paybacks. UEP's output pace of growth was increasingly slower and the obstacles imposed by the Administration to the company's progress left uncertain futures. Regardless both internal and external challenges, UEP's internal figures demonstrate that the company was a worthwhile investment when compared with similar Spanish

[83] Liquidity, Solvency and Treasure Ratios were always positive, especially Liquidity Ratios always over 20%. UEP Board of Directors: Annual Reports (1922-1944).

[84] When compares UEP's ROI with the ratios of other important electricity companies in Spain up to the Spanish Civil War i.e. *Ibérica*, *Hidrola*, UEM, ERZ, *Sevillana* and *Electra Madrid*. UEP's yields were similar to and sometimes exceeded the group's average returns. Bartolomé and Lanciotti (2011).

electricity firms until 1938. In fact, up to 1933 *Lima* might have contributed to UEP's returns selling energy at a lower price to UEP and this may well have happened in some years[85]. In addition, these high returns were likely to have another institutional origin: the symbiotic agreement between the company and the Municipality of Porto between 1923 and 1938[86]. However, the company's future became uncertain, since the company expansion had been impeded and the *statu-quo* of the market of the city of Porto was broken from 1938 onwards.

Figure n. 5. Return on Investments (ROI) of some Generating and Retailing Companies (1924-1934) (%)



Sources: Source: UEP's Boarding Committee: Annual Reports (1922-1944) and some data from Antonio Hidalgo for the Spanish retailing companies.

6. CRGE and *Sofina*, the great partner, in Lisbon, the self-contained market

Gas firms had preceded electricity companies in Portugal as foreign capital investors and Lisbon was under the rule of *Sofina* as early as 1913[87]. Sofina was the AEG's Belgian holding-group and it had become a prominent stock-holder of the Lisbon's company, CRGE; founded in 1891, it was the foremost electricity group in Portugal until its conversion in a semi-public operator as *CNE* in 1947. In Porto, CRGE also obtained an important part of the local delivery company in

[85] Essentially, a low percentage of UEP's unit-income was used to pay energy from 1926 up to 1935. In terms of total unit-costs, the percentage for reimbursing energy varied but was rarely higher than 50%. Lima's operating-ration was actually favorable to the interests of the Portuguese group up to the end of the Spanish Civil War when was reversed. Bartolomé (2009), figure 5.

[86] See Bartolomé (2012).

[87] Earlier foreign investors chose water-utilities and railway companies in 19th century. Matos and Silva (2004).

1897, but they left Porto as soon as this service started being administered by a municipally owned company in 1919, which signed a contract to be supplied with hydropower by UEP in 1923.

In 1887, public lighting in Lisbon was granted to a Belgian society, the *Sociedade anonyme d'Eclairage du Centre*, which formed a joint-stock company, the *Companhia de Gás de Lisboa*, with other foreign companies from Belgium and Germany[88]. In 1889 a new company, The *Companhia de Gás* entered the market and the competition ended up with a merger of the two companies in 1891 when CRGE was founded. Gas in Lisbon was a profitable business which had made it possible to pay out important dividends, around 25 per cent in the 1887-1888[89], but the expansion of the electricity compelled the firm to face important technological and financial challenges which might only be fulfilled with the participation of *Sofina* as of 1913. *Sofina* had been founded in 1898 and, since Heineman joined the firm in 1905 he organized the expansion of a technical and financial powerful holding-group. Thereafter, *Sofina* was a prominent example of the second wave of international groups involved in the setting up of electrical systems, featured by the use of AC in transmission and the building of electricity markets. Thus, in 1913, when *Sofina* became part of the CRGE, a flow of both capital and engineering expertise came from abroad[90]. The holding-group was responsible for building an important thermal power-plant in Bêlem which substituted the old *Junqueira* central plant (1909-1921). The new *Tejo* central plant was planned in 1914 but it started working in 1921. It stood for the core of the CRGE up to the forties; regardless its power capacity was successively enlarged[91].

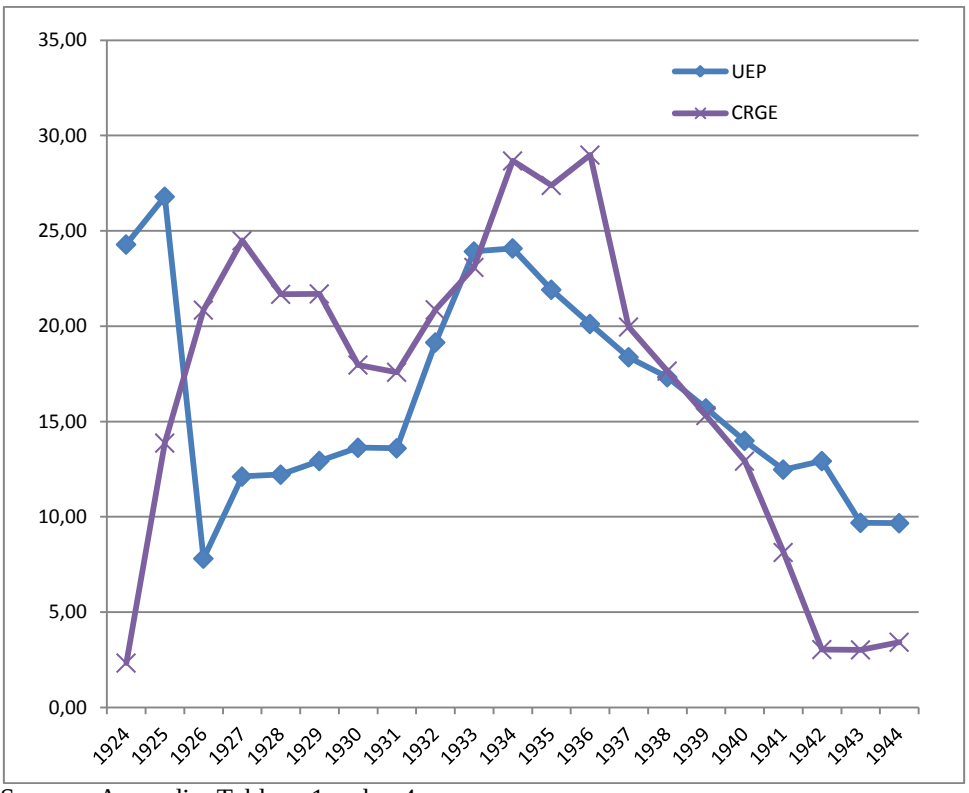
Sofina entered the firm in 1913 creating 96,000 new equity shares, which represented 43.6 percent of the total capital stock[92]. According to Matos and Silva (2004), an equal number of Portuguese and foreign members were to be maintained in the Board of Directors though foreign investors most profoundly impacted the decision-making of the firm. Until 1915, the company's chairman of the Board was always one of the Directors coming from abroad, but the Portuguese law specified a Portuguese member might be elected since then. As of 1914, *Sofina* appointed a certain number of directors --at least four in a Board of Directors of sixteen-- and the other foreign companies linked to the firm were neglected and reduced to portfolio partners. Similarly, general management of the company and technical control were entrusted to *Sofina's* staff, which exerted it from either the Headquarters in Paris or on the ground in Lisbon[93].

CRGE's capital stock was enlarged at least three times until 1928. Thereafter, it was maintained unchanged until 1945, regardless the central plant was being

[88] Matos and Silva (2004), p. 147.
[89] Matos and Silva (2004), p. 147, footnote 18.
[90] CRGE, Board of Directors, General Meetings, 1914.
[91] Barbosa, Cruz, Faria (2007).
[92] This percentage shrank to 22 % in 1948 and 15.2 percent in 1957. Bussola (2011), p. 169. According to Matos and Silva (2004, p. 155), *Sofina* was a larger share-holder (68 percent of capital).
[93] Matos and Silva (2004), p. 150-157.

expanded during those tough times. As far as we know, different items, like Reserves and Funds were basically enlarged[94].

Figure n. 6. CRGE's and UEP's ROI (in percentage)



Sources: Appendix. Table n. 1 and n. 4.

The electricity market in the city of Lisbon grew as the consumption of energy did, but the gas revenues accounted for 20 percent of the total income of the firm as late as 1938. During World War II, the gas business even grew (around a 5 percent of total CRGE's income[95]. Industrial and manufacture consumption was the main important use of electricity for the company, although it started broadcasting household appliances in the 1930s in order to improve the productivity figures of the whole electrical equipment[96]. The transmission lines went beyond the city's boundaries, but not so far, as may be confirmed in Map n. 1. During the 1920s and 1930s, CRGE produced half of the total electricity output in Portugal, but the essential paybacks came from a small but fruitful market, that of the city of Lisbon, where distribution lines were laid at a tireless pace along these years[97]. Thus, CRGE showed to be barely interested in broaden its market and building a regional market if this imposed new and remarkable

[94] The information from the enlargement of the capital stock in CRGE, in Board of Directors, General Meetings (1914-1945).Unfortunately, there is no research based on CRGE that follows a Business History approach. Thus, we still ignore most of the internal history of this company. The information from the enlargement of the capital-stock in CRGE, in (1914-1945).

[95] CRGE, Board of Directors, General Meetings, (1922-1945).

[96] Motive power added up 70 percent of CRGE's purchased electricity and 52 percent of total output in 1937. Board of Directors, General Meetings: 1937.

[97] CRGE, in Board of Directors, General Meetings (1914-1945).

investments during the difficult times of the Great Depression and last 1930s. ROI maintained rather high, as can be seen in Figure n. 6. CRGE's return on investments was always higher than that of UEP and it maintained stable until last thirties[98]. From 1938 onwards the increasing cost of coal affected seriously the company's yields[99]. This circumstance almost coincided with UEP's decline of paybacks and their struggles in the electricity market of Porto. Both preceded the Government implementation of the new plan of connecting markets and building hydro-power new power plants in order to avoid the use of the expensive coal.

7. Demanding governmental support in the 1940s

The two main markets for electricity in Portugal were supplied by foreign companies between 1922 and 1944 i.e. CRGE in Lisbon and UEP in the Portos's Region. Regardless the important differences in financial capacity and essentially technological expertise, the powerful *Sofina* and the still nascent *Lima's Group* organized fairly similar. They both turned out to be important equity's holders in their respective companies and they controlled the firms from Paris and Madrid respectively, but Portuguese capital was also involved in both firms. Despite there is no evidence on the occasional disputes in the CRGE's Board of Directors among the indigenous group and that coming from abroad, internal evidence shows how fierce was the reciprocal disagreement among foreign and domestic investors in the UEP, making their early years problematic. Similarly to other foreign investors, the *Lima's Group* coped with the inherent difficulties of exporting utilities at different currencies in the thirties and also managed to resist the opposition of the Portuguese group to the never-ending increase of scale of the hydro-powered system and the subsequent rising demand of new funds.

However, there existed some important differences among how both holding-groups evolved in Portugal during this period. On the one hand, CRGE supplied Lisbon with thermal electricity and once the *Tejo's* Power House was working, the company obtained an increasingly higher yield on investments without augmenting the capital-stock. *Sofina* was obtaining additional revenues by means of the payment of overheads for the financial and technical assistance and, as far as we know, the holding-group retained easily the control of CRGE since the rest of the share-holders were somewhat dispersed. Though one attempt was made in river Zêzere there existed no sign the firm intended decisively to enlarge their market by adding water-powered facilities during the 1930s. On the other hand, the water-powered distributor, UEP, faced a small and at some point diminishing market in Porto. It was absolutely imperative for the company augmenting the size of the market by placing lines, signing new contracts with municipalities and

[98] *Sofina* enjoyed also remarkable overheads for the financial or technical assistance provided that did not interrupted but increased after the World War II what implies *Sofina* maintained always a good partnership in this business. Matos and Silva (2004), p. 157 and Bussola (2011), p. 189.

[99] Conversely, Reserves and Redemptions grew enormously as of 1938. This shows how CRGE initiated a defensive policy in order to preserve the company to the tough times. Appendix, Table 4.

being granted for the use of additional water resources by the Government. The atmosphere of distrust among the company's managers made this expansion lightly difficult, but government rulers were the ones to impede a major progress of the company during the interwar period in North Portugal. As a result, having followed remarkably different paths of growth, neither UEP nor CRGE went far beyond the burdens of their urban markets of electricity from 1922 up to 1944.

The CRGE's level of return on investment was always above of that of UEP, what is common to other thermal-powered electricity companies. In addition, UEP's yield on investments began slowly to shrink from the early thirties onwards whilst CRGE's difficulties only started with the fuel-shortage in the eve of the 2nd World War. This coincided with UEP's difficulties in the market of the city of Porto. Then, the Salazar's Plan would be welcome by both companies, since every new investment would be backed and guaranteed by the state. This coincidence of the CRGE's difficulties with the implementation of the Governmental Plan might suggest that the proximity of the company to the decision-making centers and the size of the international company i.e. *Sofina* made a difference. In fact, having opened some open-tenders in the 1930swith a view of supporting an electrification project, it was only during the shortage of fuel, which seriously affected CRGE that the cooperation among public and foreign operators came into effect. Then, governmental support emerged as a vital need for electrification provided Portugal was a poor electrified country, though the own Government had impeded the expansion of foreign firms during the previous years.

Collaboration with public operator was indispensable not only because capital was scarce, but also the ascent of public intervention since during the 1930s, this government had impeded an electrification progress in Portugal fostered by both new and already settled promoters. Contrary to one may expect, the electrification ruled by the state in the 1940s and 1950s was told as being a triumph of this government.

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APPENDIX

Table A-1. UEP's Balance Sheet and Electricity Output (1922-1945)
(1-5 in thousands of Portuguese Escudo)
(6-8 in MWh)

	1. Share-holders' Equities+ Reserves	2. Issued Debt Securities	3. Other non-current liabilities	4. Investment in Associates	5. Fixed Assets	6. Electricity Output	7. Acquired Electricity	8. Purchased Electricity
1922	5,000		438	59	895			
1923	5,000		2,691	59	3,361	8,898		
1924	5,100		4,720	237	5,040	15,653		
1925	5,062		4,632	547	5,797	19,101		15,147
1926	20,130		2,761	1,622	12,058	21,541		17,947
1927	24,408		2,897	1,583	25,520	26,787		21,416
1928	34,356		2,348	938	32,418	33,439		27,088
1929	40,566		1,753	1,139	40,907	37,592		34,434
1930	40,829	5,123	2,744	1,264	44,814	46,410		38,432
1931	41,108	10,523	3,595	1,401	50,503	51,000		41,459
1932	41,387	10,523	4,976	1,505	49,555	58,856		48,490
1933	41,783	15,947	3,199	1,545	50,573	65,417		52,797
1934	43,283	16,262	2,883	2,071	49,501	71,638		57,913
1935	44,804	21,689	4,551	1,960	49,649	73,482		58,955
1936	46,295	31,502	6,133	1,850	48,253	85,645		60,720
1937	47,761	30,500	6,134	10,395	45,598	93,060		64,055
1938	51,200	27,750	6,712	11,416	45,300	98,639		68,316
1939	55,144	25,000	3,180	10,703	46,847	94,918		61,788
1940	58,826	24,816	2,366	11,762	47,087	92,598		59,533
1941	72,238	22,435	3,156	11,156	72,163	102,948		71,361
1942	75,738	18,034	1,504	3,956	77,799	118,142	4,667	80,394
1943	79,538	17,613	1,169	5,465	81,461	109,708	17,967	105,420
1944	81,558	30,000	2,431	5,655	86,759	122,870	19,122	118,750
1945	81,603	29,131		3,323		135,330	12,957	135,330

Source: Board of Directors: *Annual Reports*. Lima (1924-1945) and UEP (1924-1945).
Electricity Output, see Bartolomé (2009).

Table A-2. UEP's Performance. Northern System (1923-1945) (in MWh)

	1. Electricity Output	2. Purchased Electricity	3. Hydroelectricy Output	4. Acquired Electricity	5. HT lines in km
1923	8,898		8,898		
1924	15,653		15,653		75
1925	19,101	15,147	19,101		110
1926	21,541	17,947	21,541		115
1927	26,787	21,416	26,787		149
1928	33,439	27,088			234
1929	37,592	34,434			402
1930	46,410	38,432			612
1931	51,000	41,459			665
1932	58,856	48,490	53,576		697
1933	65,417	52,797			711
1934	71,638	57,913			731
1935	73,482	58,955			845
1936	74,986	60,720			904
1937	79,934	64,055			965
1938	84,905	68,316			977
1939	78,912	61,788			1,002
1940	74,684	59,533			1,005
1941	83,807	71,372	71,252		1,054
1942	92,930	80,394	89,382	4,667	1,084
1943	84,253	84,162	67,913	17,967	1,110
1944	91,922	93,032	79,641	19,122	1,116
1945	110,427	103,158	87,181	12,957	1,128

Source: Board of Directors: *Annual Reports*. Lima (1924-1945) and UEP (1924-1945).

Table A-3. UEP's Budget and Accounting Report (in thousand Portuguese Escudo)

	1.Total Assets	2.Fixed Assets	3.Total Costs	4. Total Income	5. Total Profits	6.Dividend (Board of Directors payments comprised)
1924	11,259	5,040	1,563	2,802	1,239	824
1925	11,583	5,797	1,691	3,047	1,356	831
1926	25,243	12,058	1,856	3,429	1,573	1,394
1927	33,057	25,520	1,641	4,598	2,957	2,703
1928	42,682	32,418	2,672	6,840	4,197	3,842
1929	51,582	40,907	4,251	9,499	5,247	4,875
1930	56,937	44,814	3,728	9,292	5,564	5,134
1931	62,641	50,503	5,680	11,271	5,590	4,335
1932	67,571	49,555	6,310	14,235	7,925	4,476
1933	73,982	50,573	5,462	15,458	9,995	5,000
1934	74,244	49,501	5,548	15,973	10,425	5,026
1935	82,066	49,649	6,140	15,879	9,819	4,989
1936	94,089	48,253	7,272	16,586	9,315	4,559
1937	94,316	45,598	7,574	16,351	8,777	4,527
1938	96,212	45,300	7,344	16,218	8,873	4,532
1939	93,445	46,847	6,238	14,892	8,654	4,519
1940	95,531	47,087	6,285	14,517	8,232	4,494
1941	111,604	72,163	8,550	17,567	9,017	5,635
1942	115,069	77,799	8,456	18,250	9,793	6,280
1943	114,779	81,461	7,679	15,386	7,707	5,224
1944	131,509	86,759	9,340	17,227	7,887	6,000
1945			9,673	17,377	7,705	6,000

Source: Board of Directors: *Annual Reports*. Lima (1924-1945) and UEP (1924-1945).

Table A-4. CRGE: some figures from Badgets and Accounting Reports(in thousand Portuguese Escudo)

	1. Share Holders' Equities	2. Reserves	3. Total Profits
1924	55,611	940	1,321
1925	55,611	3,632	8,220
1926	55,611	5,350	12,709
1927	55,611	7,955	15,569
1928	73,611	10,690	18,274
1929	73,611	13,465	18,896
1930	73,611	23,750	17,494
1931	73,611	35,750	19,234
1932	73,611	29,513	21,518
1933	73,611	31,513	24,274
1934	73,611	33,513	30,718
1935	73,611	38,513	30,708
1936	73,611	44,230	34,154
1937	73,611	110,151	36,687
1938	73,611	122,842	34,679
1939	73,611	129,868	31,166
1940	73,611	147,813	28,621
1941	73,611	157,841	18,831
1942	73,611	171,408	7,455
1943	73,611	171,408	7,414
1944	73,611	137,302	7,228
1945	172,000	171,408	10,217

Source: Board of Directors: *Annual Reports*. CRGE (1921-1945).