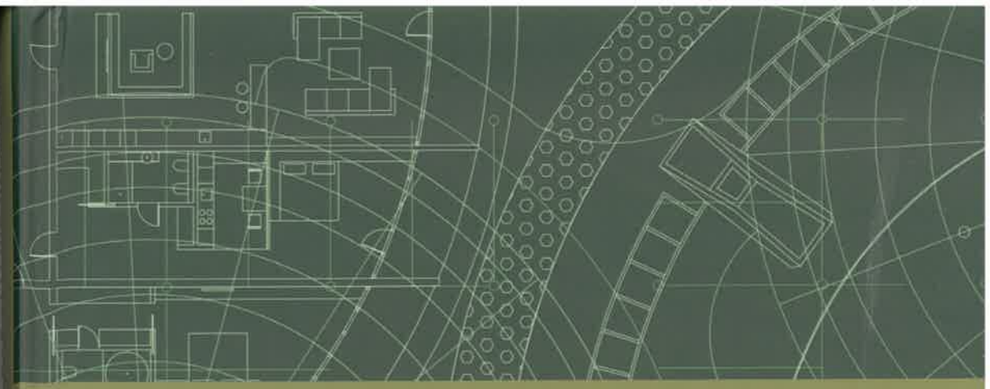

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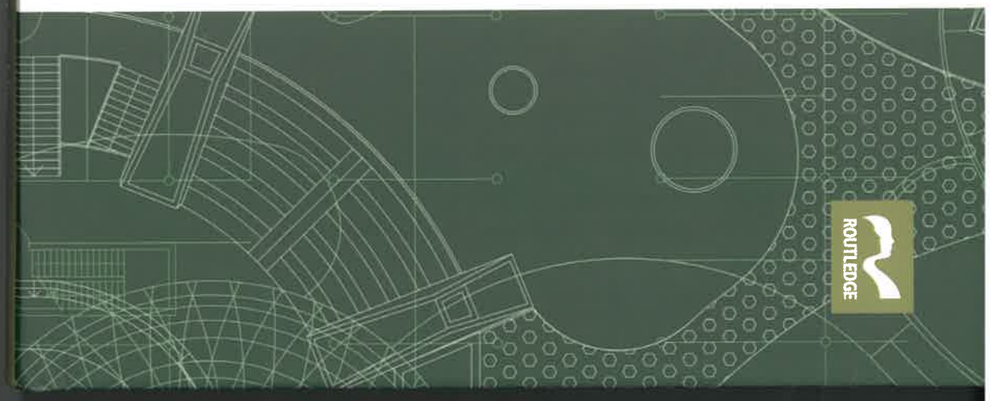

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7 Pre-war and war energy market in Latin Europe

Gas and electricity in Spain and France in the 1930s*

Mercedes Fernández-Paradas, Carlos Larrinaga Rodríguez and Antonio Jesús Pinto Tortosa

7.1 Introduction

In the 1930s, Spain and France experienced an increase in gas and electricity consumption, in the middle of the global crisis that the Wall Street 1929 Crash and the subsequent Great Depression generated (Matés-Barco, 2023, pp. 1–37). As a result of the crisis, the political and social atmosphere in Europe turned more tense and complicated during the decade. For example, on 14 April 1931 the Spanish 2nd Republic was proclaimed, and in May 1936 the Popular Front won the elections in France. Such events talk about a convulse period in which the social divide, not only between the rich and the poor, but also between opposed ideologies, grew, too. Besides, on 18 July 1936 the Spanish Civil War exploded: the conflict would last until the 1 April 1939, when the triumph of the nationalist army inaugurated Franco's dictatorship. Only five months later, on 1 September 1939, Nazi troops occupied the Polish city of Gdansk, motivating France's war declaration against Germany, which in a few weeks unleashed the Second World War (1939–1945). The German army marched quickly towards France and occupied most of it. In June 1940 an armistice declared Germany's victory over the French, starting a four-year German domination over the country, either directly or indirectly.

We have chosen Spain and France as a case study for this research because they share a border, as well as a common cultural, political, and economic background, which goes back to the nineteenth century, but was especially strengthened during the First World War (1914–1918). In the nineteenth century, France was one of the major foreign investors in Spain's take-off, namely in the gas sector.[1] Considering their extension, both countries are similar, too: Spain covers an area of 505,9544 km^2, and France 552,000 km^2, not including colonial possessions at the time. Yet, there are relevant differences between them: firstly, in terms of population, in 1928 Spain had 22,977,000 inhabitants,

* We thank Jean-Pierre Williot for his help with French gas and electricity statistics in the period that we study in this chapter. This research is part of the results of the R+D+I Research Project "Gas in Latin Europe: A comparative and global perspective (1818–1945)", PID2020-112844GB-I00, financed by the Ministry of Science and Innovation of the Government of Spain and ERDF Funds.

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whereas France's population was 1.8 times as higher, amounting 41,050,000 people. Therefore, population density was different in Spain and France: 45.4 inhabitants/km² in the former, and 74.4 inhabitants/km² in the latter. So were the figures of urban population, too: 4,664,617 Spaniards lived in cities (villages of over 10,000 inhabitants), which represented 20.3% (one fifth) of the country's population (INE, 1927–1928); and around 13,869,765 French were included under the title "urban population" in the 1920s, which represented 36% of the country's people, and escalated to over 40% in the 1930s (Chatel et al., 2017, pp. 1021–1040).[2] Likewise, French economy was much more powerful: in 1928, French Gross Domestic Product (GDP) grew up to 181,912 million Geary-Khamis 1990 dollars, whereas the Spanish GDP only amounted 59,371 million Geary-Khamis 1990 dollars (3.1 times lower than the French one). Raw domestic income per habitant also evidenced relevant differences: 4,432 Geary-Khamis 1990 dollars in France, and 2,584 Geary-Khamis dollars in Spain (1.7 times lower) (Maddison, 2003, pp. 38–68). The data provided are crucial to study network infrastructures, namely of gas and electricity, which are linked to population density and energy demand. That is how we can explain, for instance, a major progress of such infrastructures in France.

In this chapter, we study gas and electricity production and consumption in France and Spain, assuming a comparative scope, and including other Latin European countries in the research. Given the limitations imposed by a limited corpus of documentary sources, and considering the research topics that other scholars have previously covered, we will compare France and Spain to Portugal and Italy, in electricity production and consumption; and to the latter country, in the case of gas. Two main factors brought a turning point to competition between gas and electricity after the First World War: on the one hand, the building of waterfalls and long-distance transportation of electricity by companies; on the other hand, coal scarcity and increase in cost. Combined, they favoured the conquest of most lighting market by electricity. Gas companies tried to react by proposing new uses of this energy source, at home and in factories. Statistical studies used in the following pages start in 1928, with the aim of assessing the impact of the Great Depression on France's and Spain's energy market.

7.2 Electricity

Table 7.1 shows Spanish and French production of electricity between 1928 and 1940, distinguishing between hydraulic and thermic energy. In 1928, electricity production in France rose 12,976 million kWh, 4.8 times Spain's production (2,714 million kWh). Considering both countries' population, GDP and per capita income, which we have analysed in the previous section, Spain's production level was lower than expected. It is probably due to the remarkable fact that evolution of electricity production and consumption behaved differently from general national economic development (Table 7.3). Between 1929 and 1938, in Spain both indicators stayed over the 1928 figures, in an ever-growing trend that was only interrupted in 1935. The year 1931 registered the biggest

Table 7.1 Electricity production in Spain and France (1928–1940), expressed in million kWh (1928 represents 100%)

	Spain						*France*					
Year	*Hydraulic*		*Thermic*		***Total***		*Hydraulic*		*Thermic*		***Total***	
1928	2,428	100	285	100	**2,714**	**100**	5,598	100	7,378	100	**12,976**	**100**
1929	2,584	106	556	195	**3,140**	**116**	6,142	110	8,210	112	**14,352**	**111**
1930	2,884	119	270	95	**3,154**	**116**	6,876	123	8,463	115	**15,339**	**118**
1931	2,921	120	299	105	**3,221**	**119**	5,851	104	8,381	114	**14,232**	**110**
1932	2,920	120	315	110	**3,234**	**119**	5,884	105	7,708	105	**13,592**	**105**
1933	3,112	128	250	88	**3,362**	**124**	6,665	119	8,241	112	**14,906**	**115**
1934	3,296	136	263	92	**3,559**	**131**	7,195	128	7,977	109	**15,172**	**117**
1935	3,365	138	279	98	**3.365**	**124**	8,164	146	7,654	104	**15,818**	**122**
1936	3,366	138	279	98	**3,644**	**134**	8,836	158	7,823	108	**16,659**	**128**
1937	2,305	95	166	58	**2,645**	**97**	9,872	176	8,290	113	**18,162**	**140**
1938	2,236	93	512[a]	180	**2.749**	**101**	10,200	182	8,800	121	**19,000**	**146**
1939	2,844	117	267	94	**3,111**	**115**	12,174	217	9,800	133	**21,974**	**169**
1940	3,353	138	264	93	**3,617**	**133**	11,833	211	6,850	93	**18,683**	**144**

Source: in the Spanish case, Bartolomé Rodríguez (2007, p. 131) for the years 1928–1936, and the Ministerio de Industria y Comercio (1949) for 1937–1940. In France, Vidal Burdils (1946, p. 10) for 1928–1938, and in the figures provided by Williot for 1939–1940. The latter does not include data for the MosPielle, Haut-Rhin, and Bas-Rhin departments. Author-designed.

Note:

[a] The 1938 production figures in thermoelectricity seem anomalous. We have taken them from Vidal Burdils (1946) and the Ministerio de Industria y Comercio (1949). There is no way to explain such a relevant increase in production, compared to 1937.

downfall in industrial production of energy since 1929: 13.5%. Nevertheless, electricity production then was 19% higher than in 1928, and 2.6 times higher compared to the 1929 levels. GDP in 1931 was 93.9% of the one in 1929, a value that the country did not reach again until 1935 (Carreras and Tafunell, 2005, pp. 251–269; Martín Aceña, 2011, p. 61). In 1936, electricity production was 36% higher than in 1928. All in all, in the whole period only in 1937 was it 3% lower than in 1938; in fact, in 1939 and 1940 production surpassed again the 1928 levels. And during the Spanish Civil War, electricity production grew in both sides, though growth was more acute in the nationalist one (Fernández-Paradas and Rodríguez Martín, 2023, pp. 159–184).

French electricity production evolved in a very similar way: it stayed over the 1928 levels between 1929 and 1938. It lowered a bit in 1932, but it did not stop increasing ever since: in 1939 it was 69% higher than in 1928. In 1940 it decreased, showing figures that were slightly below the pre-war levels. As in Spain, too, electricity production data do not go hand in hand with France's general economic situation: GDP kept on decreasing until 1932, when it reached its lowest peak, 85.3% the GDP of 1929. The latter year's level was not reached by French economy until 1939 (Aldcroft, 2003, pp. 107–107).[3] Therefore, we can conclude that the evolution of the electric sector was more positive than the economic context in both countries, where departure

electrification levels were low, so there was room for growth in the sector, even in the Great Depression context. We do not mean that the crisis had no impact in the energy market of both countries: a close analysis of the data provided shows how electricity production, for example, stayed stuck in Spain in 1929–1932, and in France in 1929–1933.

Hydroelectricity dominated the Spanish electric market:[4] it represented 89.5% of the overall electricity production in 1928, and it increased 38% in 1935. In 1937–1938 it dropped dramatically, staying 5%–7% under the 1928 level, but it grew again since the end of the Spanish Civil War in 1939, when it was 17% higher than in 1928. In 1940 it reached figures similar to 1935–1936. On the opposite side of the electric market, thermoelectricity always stayed under levels lower than the 1928 ones, with the exception of 1931–1932, and 1938. In 1940, hydroelectricity was even more relevant, taking 92.7% of the electric market, whereas thermoelectricity only represented 7.3%. The advance of hydroelectric plants, which overpassed the number of thermic plants, made it possible for the substitution of public gas lighting with public electric lighting. Among other reasons, higher coal prices and lower electricity prices favoured the trend (Otero Carvajal, 2020, pp. 10–11).

France counted on more hydrological resources than Spain, but two factors determined the lower impact of hydroelectricity in the electric market (43.1% of overall electric production): on the one hand, it had higher coal reserves than Spain; on the other hand, Spain's hillier landscape favoured the building of waterfalls (Espejo and García Marín, 2010, pp. 107–129).[5] Hydroelectricity always stayed over the 1928 figures, showing a trend to grow safe for the years 1931–1932, though even in this period levels stayed higher than four years before. Growth was more intense than in Spain: by 1938, it had increased 82%. Thermoelectricity played a more relevant role than in Spain, but it stayed behind hydroelectricity. It kept growing along the decade, too, and in 1938 its production was 21% higher than ten years before.

Table 7.2 shows how power capacity also increased, faster than electric production in both countries, which led to power overflow, with regard to existing demand. It might be possible to explain this because of the long-term investment cycle in the electric sector: years went by between the making of the decision to invest in a new plant, and the actual moment when the plant started to operate. In the period that we have chosen, investment characterised the late 1920s financial euphoria, but many plants did not start working until the first years of the Great Depression. In France, there is information until 1936, a year when power capacity was 60% higher than in 1928, whereas it was 53% higher in Spain. Operating hours stayed below the 1928, due to the aforementioned overflow, and to the economic recession, a context that did not favour energy consumption. The decay in the use of the plants was higher in France during the Depression, but it was also dramatic in Spain during the Civil War. The loss in generated electricity was relevant in both countries, though Spain's figures doubled those of France, which indicates poor efficiency in plants and networks.

Table 7.2 Power capacity and usage hours in Spain and France (1928–1940), expressed in million kWh (1928 represents 100%)

	Power capacity				*Usage hours*			
Year	*Spain*		*France*		*Spain*		*France*	
1928	1,020	100	6,980	100	2,400	100	1,912	100
1929	1,100	108	7,474	107	2,375	99	1,939	101
1930	1,200	118	7,920	113	2,330	97	1,645	86
1931	1,144	112	8,653	124	2,335	97	1,409	74
1932	1,256	123	9,643	138	2,240	93	1,495	78
1933	1,338	131	10,160	145	2,165	90	1,459	76
1934	1,353	133	10,420	149	2,240	93	1,459	76
1935	1,480	145	10,846	155	2,215	92	1,490	78
1936	1,565	153	11,200	160	1,789	74	-	-
1937	1,566	153	-	-	1,579	65	-	-
1938	1,568	153	-	-	1,755	73	-	-
1939	1,553	152	-	-	2,010	84	-	-
1940	1,554	152	-	-	2,325	97	-	-

Source: Vidal Burdils (1946, pp. 4, 21), for power capacity and usage hours. Author-designed.

Another element that helps explain the growth of electricity in France is the development of high power and low power transportation. The lower network grew from 2,800 in 1926, 4,000 km, in 1929, 5,200 in 1931, 7,400 in 1934 to 10,600 km in 1937. In this year, according to Vidal Burdils (1946, p. 27), French transportation network was the largest in the world. The French Ministry of Agriculture contributed to the process, financing new networks in the countryside (Sintes and Vidal Burdils, 1933, p. 699). Concerning high power wire, in 1933 France had more than 225,000 km; two years later,[6] Spain had around 33,000 km. At the same time that in Spain there was a majority of production-consumption point lines, "in France they had started to integrate charges, creating interconnection networks between different electric markets, which diversified the production forces, as well as potential consumers" (Bartolomé Rodríguez, 2005, 2007, pp. 25–26; Aubanell, 2019, p. 53).

Table 7.3 displays the evolution of electric consumption, which evolved in a very similar way to electric production: it increased along the decade, but became stuck, or even dropped, in the Great Depression and the Spanish Civil War, respectively. In the Spanish case, we count on consumption figures provided by Bartolomé Rodríguez (2007) for 1928–1936; for 1937–1940, we have deduced 21% losses from the data given by the Ministerio de Industria y Comercio (1949). In France, we have used the data included in Table 7.1, deducing 12.7% losses from them, for 1928–1938; for the years 1939–1940, we count on the figures of the Institut National de la Statistique et des Études Économiques (1966), from which we have deduced the same percentage. Consumption decayed in Spain in 1937–1938, in the middle of the Civil War, whereas in France it reached its highest peak in 1939–1940, though in 1940 production was a bit lower than in 1939.

Table 7.3 Electricity consumption in Spain and France (1928–1940), expressed in million kWh (1928 represents 100%)

	Spain		*France*	
Year				
1928	2,415	100	11,328	100
1929	2,433	101	12,529	111
1930	2,609	108	13,391	118
1931	2,681	111	12,424	110
1932	2,802	116	11,866	105
1933	2,953	122	13,013	115
1934	3,158	131	13,245	117
1935	3,402	141	13,809	122
1936	2,743	113	14,543	128
1937	1,953	81	15,855	140
1938	1,958	81	16,587	146
1939	2,458	102	19,467.9	172
1940	2,857	118	16,674.3	147

Source: Bartolomé Rodríguez (2007, p. 133), for electric consumption in Spain in 1928–1936; Ministerio de Industria y Comercio (1949) for 1937–1940; data included in Table 7.1. Author-designed.

We have studied several relevant indicators about electrification. For example, Table 7.4 shows the number of people with access to electricity: in early 1930s, 88% of Spanish people,[7] and 97.6% French people (close to British numbers in the latter case). Italy and Portugal were at an intermediate point,[8] with 93.4% and 90% people with access to electricity, respectively. Seeger (1936, p. 18) states that, in European context, the last two countries were among the ones with a higher electrification level; Switzerland and Denmark led the rank, with almost 100% of its population granted electricity access. At the end of the list were eastern European countries, namely Romania, with 21.7%, and Bulgaria, with 24.8%.

Per habitant and km^2 kWh production, expressed in millions, was 28,750 in France, and 4,3 times lower in Spain (6,845) (Vidal Burdils, 1946, p. 13). Therefore, electricity was indeed more spread in France than in Spain, in terms of population with access to it, and considering the extension of the network, too.

Table 7.5 displays per habitant production in 1928, 1935, and 1938: respectively, the year before the Wall Street Crack, the year prior to the start of the Spanish Civil War and the year before the beginning of the Second World War. The data included in it confirms the previous assumption. Besides, we add other Latin European countries, such as Italy and Portugal, as well as information from Sweden and Norway, the latter with higher production ratios. In 1928 France's per habitant production was 2.1 times higher than Spain's; Italian figures positioned between the two, but closer to France. Portugal had much lower ratios than Spain. In all the countries analysed, per habitant production grew significantly in 1935–1938, with the sole exception of Spain, due to the war context. For instance, France's production in 1938 was 43% higher than one decade before, and the gap between this country and Spain increased.

Table 7.4 People (%) with access to electricity, and with the chance to consume gas, too; percentage of gaslight and electricity points in European lighting, Madrid and Paris by early 1930s

Country	*People with access to electricity (%)*	*People with access to gas (%)*	*Gaslight points, related to total light points (%)*	*Electric light points, related to total light points (%)*
Germany	87.7	51.5	46.2	53.8
Austria	n.d.	40.4	27.5	72.5
Belgium	98.7	58.4	n.d.	n.d.
Bulgaria	24.8	n.d.	n.d.	n.d.
Czechoslovakia	72.0	18.2	n.d.	n.d.
Denmark	100	50.4	n.d.	n.d.
Spain	88.0	23.6	27.5	72.5
Estonia	27.3	n.d.	n.d.	n.d.
Finland	66.4	9.7	27.5	76.9
France	97.6	52.2	n.d.	n.d.
Great Britain	97.4	n.d.	n.d.	n.d.
England	n.d.	n.d.	54.0	46.0
Greece	n.d.	n.d.	n.d.	n.d.
Netherlands	96.3	69.0	12.0	88.0
Hungary	61.4	53.5	34.1	65.9
Ireland	29.0	n.d.	n.d.	n.d.
Italy	93.4	28.2	n.d.	n.d.
Lithuania	n.d.	n.d.	n.d.	n.d.
Luxembourg	90	n.d.	n.d.	n.d.
Norway	69.0	10.5	6.7	93.3
Poland	32.3	14.5	n.d.	n.d.
Portugal	90.0	n.d.	n.d.	n.d.
Romania	21.7	n.d.	n.d.	n.d.
Sweden	91.7	25.9	14.5	85.5
Switzerland	100	53.4	2.3	97.7
Madrid	n.d.	n.d.	81.1	18.9
Paris	n.d.	n.d.	67.7	32.3

Source: Seeger (1936, pp. 18, 25, 27); Union Internationale de l'Industrie du Gaz (1949). Author-designed. N.d.: no data.

Table 7.5 Per habitant electricity production in Spain, France, Italy, Portugal, Sweden and Norway, in 1928, 1935 and 1938, expressed in kWh (1928 represents 100%)

Country/ Year	*1928*		*1935*		*1938*	
Spain	118.1	100	137.0	116	108.7	92
France	316.1	100		119	452.8	143
Italy	261.7	100	n.d.		343.3	131
Portugal	31.5	100	n.d.		51.9	165
Sweden	758.0	100	n.d.		1,256.8	166
Norway	2,496.1	100	n.d.		3,154.2	126

Source: For Spain and France, Table 7.1. Population figures are included in Maddison (2003, pp. 38, 44). In the rest of the countries, but for 1935, Bartolomé Rodríguez (2007, p. 18). Author-designed.

In relation to GDP, kWh production shows big differences between countries. In 1928, Spain registered a 0.031 production and France 0.076 (more than twice the Spanish level). In 1937 production grew, up to 0.035 and 0.1111 respectively. Portugal and Spain had similar figures in those years, as happened to France and Italy (Bartolomé Rodríguez, 2007, p. 18).

Distribution of consumption is also relevant. In Spain, in 1936, 49.1% went to the industry; 23.8% to losses; 19.2% to lighting and domestic uses; and 7.9% to traction.[9] It is remarkable that electric light points represented 75.5% of all light points, so gaslight points were still used: Madrid had 81.8% of them (Table 7.4). In France, in 1937, 46.5% of electric production went to industrial driving force; 18.5% to electrochemistry and electrometallurgy; 12.7% to losses; 11.9% to lighting and domestic uses; 6.1% to electric traction; and 4.3% to small driving force (Vidal Burdils, 1946, p. 20; Bartolomé Rodríguez, 2007, p. 17). We need to emphasise the bigger industrial consumption in France, higher-level lighting and domestic use in Spain, and bigger losses in the latter, too. We can explain France's figure thanks to the combination of different factors: a bigger population, a more powerful economy, higher per capita income and a larger development of transportation network for electric fluid. Moreover, the industrial sector, stronger in France, was a major consumer of electricity.

7.3 Gas

Table 7.6 describes gas production in Spain and France between 1928 and 1940,[10] in order to compare the figures of both countries. Spain grew in a sustained way between 1928 and 1935: in the latter year gas production was 63%

Table 7.6 Gas production in Spain and France, expressed in thousands of m³ (1928–1940) (1928 corresponds to 100%)

Country/ Year	*Spain*		*France*	
1928	115,843	100	1,897,000	100
1929	127,488	110	1,996,000	105
1930	152,082	131	1,996,000	105
1931	163,255	141	2,023,000	106
1932	173,925	150	1,996,000	105
1933	179,218	151	2,007,000	105
1934	183,484	158	1,980,000	104
1935	189,047	163	1,754,211	92
1936	177,842	154	1,913,000	100
1937	135,381	117	1,914,000	100
1938	142,183	123	1,722,867	90
1939	168,196	145	1,532,753	80
1940	205,926	178	1,405,779	74

Source: For Spain, Fernández-Paradas and Larrinaga (2018, p. 32), for the years 1928–1934, and Fernández-Paradas (2019, p. 29), for 1936–1937. In the French case, data for 1935, and 1938–1940 can be found in Fernández-Paradas, Martínez-López, and Mirás-Araujo (2023); for the rest of the years included in the series figures provided by Williot. Author-designed.

higher than in 1928. It decreased since 1936, with ups and downs, but it always stayed way over the 1928 level. In 1939 it increased again, starting a trend that was confirmed in 1940, when production was 78% higher than in 1928, thus recovering and overpassing the pre-war figures. The 1936 downfall was due to the drop in production in the Republican side, especially in Catalonia and Madrid, the latter being the main gas-producing centre in the country. Moreover, problems in coal supply, together with the dismantling of the board of many companies, contributed to the negative context. The split of the companies' actives was also more harmful for the interest of the Republican side (Fernández-Paradas, 2019, pp. 25–50; Fernández-Paradas and Rodríguez Martín, 2023, pp. 159–184). In France, though bigger coal reserves made it possible for gas production to reach much higher levels than in Spain (more than ten times), it experienced a discrete growth until 1932, when it dropped (from 106% to 105%, with regard to 1928), probably as a consequence of the economic recession provoked by the Great Depression, as well as the advance of electricity. In 1933 it recovered slightly, but it stayed only 5% higher than in 1928, the same proportion as the previous year. Since then, the drop accelerated, and in 1940 gas production was on 74% of the one reached in 1928. In only five years, between 1935 and 1940, it had decreased 19.9%.

Table 7.7 reports gas consumption in Spain and France between 1928 and 1940. Taking 1928 as a reference, consumption only dropped in both countries in war context: in 1937 and 1938 in Spain, and in 1939–1940 in France. In this field, the Spanish gas sector grew continuously and significantly until 1935, but for 1934, in which growth was only 3%. The year 1936 marked a turning point, when the trend reverted, with special attention to 1937, when it dropped 47%.

Table 7.7 Gas consumption in Spain and France (1928–1940), in thousand m³ (1928 represents 100%)

Year/Country	*Spain*		*France*	
1928	90,820	100	1,722,465	100
1929	99,950	110	1,865,465	108
1930	118,767	130	1,865,225	108
1931	127,496	140	1,890,438	110
1932	137,312	151	1,865,604	108
1933	143,701	158	1,875,427	109
1934	146,387	161	1,850,443	107
1935	153,033	168	1,801,887	105
1936	144,146	158	1,788,313	104
1937	101,607	111	1,789,176	104
1938	108,903	119	1,769,691	103
1939	132,549	145	1,574,410	91
1940	171,018	188	1,443,985	84

Source: For Spain, 1928–1929, Fernández-Paradas and Larrinaga (2018, p. 32). For the rest of the years, and for the French case, Union Internationale de l'Industrie du Gaz (1949). Author-designed.

In France, though gas consumption always stayed over the 1928 level until 1940, growth pace was slower than in Spain, but in 1937–1938, when Spain levels dropped dramatically, as previously stated. The year 1940 marked the highest peak in gas consumption in Spain: 48% higher than in 1928; in France, it was the year 1931, when consumption was 10% higher than in 1928.

It is relevant to highlight the meaningful contrast between the accelerated growth in gas consumption in Spain in the said period, and its slower rhythm in French territory, where increase was almost non-existent. Among other reasons, one might mention the different departure point of the two countries in gas production: whereas French gas sector was already consolidated, Spanish take-off in the field came later, so in the 1920s and 1930s there was still room for improvement and growth.

With regard to the uses of gas, by 1930 in Spain most of it (77.6%) was consumed at home, followed by public lighting (19.1%), and industries (3.3%).[11] The situation had not changed in 1935: 79.9% was consumed at home, 16.8% in public lighting, and 3.3% in industries; figures for 1937 were 86.40%, 7.90%, and 5.7%, respectively (Union Internationale de l'Industrie du Gaz, 1949). In France, in 1938 distribution of uses differed from the Spanish case: 53% at home, 36.7% in industries, 7.45% for commercial uses and 2.8% for public lighting (Institut National de la Statistique et des Études Économiques, 1966). As we can see, domestic use was much higher than industrial use in Spain, and public gas lighting still resisted in the 1930s. In contrast, French public gas lighting was half the Spanish; it devoted most gas produced to domestic uses, too, but in a much lower percentage than in Spain. All in all, France showed a more diversified use of gas, which explains its broader diffusion in the country, given a bigger demand by factories, main gas consumers. A late development of the Spanish gas sector, together with a later industrial take-off, explains lower consumer rates here, and a bigger advance of the new energy source: electricity.

Industrial uses of gas started in France in 1818, and in 1842 in Spain: a reason why French gas sector was one of the most powerful ones in Europe. French companies, engineers and investors arrived in Mediterranean countries, playing a crucial role in the sector's take-off in them. This is one of the reasons why electricity found so much resistance by gas companies in France, no matter how small the village in which they operated, but in Spain it found an open market of opportunities, but for medium- and large-size cities, where gas companies operated in monopolistic conditions.[12] However, at the beginning of the twentieth century, there were around 1,000 gas factories in France, and only 81 in Spain (Sudrià, 1983, pp. 97–118).

Table 7.8 depicts gas diffusion in Spain and France in 1937. French subscribers amounted to 4,833,275, and the Spanish ones to only 378,973 (12,7 times below). Given the different dimension of both markets, France was one of the European countries where most people had access to gas supply: half its population were subscribers. The lead in the rank corresponded to the Netherlands, with 69% of its inhabitants subscribed to gas supply. The Spanish

Table 7.8 Indicators of gas diffusion in Spain and France in 1937

Indicator/Country	*Spain*	*France*
Population	25,043,000	41,930,000
Inhabitants in supplied areas	5,923,822	22,025,336
% inhabitants with gas access	23.6	52.2
Inhabitants per km²	49	76
Subscribers	378,973	4,833,275
Subscribers per km²	0.7	9.0
Pipeline extension	2,426	41,979[a]
Pipeline km per km²	0.0048	0.0760
Gas consumption	101,607	1,789,176
Gas consumption per capita, m³	4	42
Gas consumption per subscriber, m³	268	370
Gas consumption per capita in supplied areas, m³	17	81

Source: Union Internationale de l'Industrie du Gaz (1949).
Note:
[a] The figure refers to 1947.

percentage, 23.6%, was similar to the Italian (28.2%) and the Swedish (25.9%). All of them were higher in the rank than northern European nations (Finland, 9.7%; Norway, 10.5%) or central-eastern European countries (Poland, 14.5%; Czechoslovakia, 18.2%).

Concerning the extension of gas pipelines, and their density per km², in 1940 France counted on 38,000 kilometres, including distribution and transportation networks (the 1937 data is missing). In 1937, Spain had 2,246 kilometres of pipelines built, 15.7 times below the French one. Consequently, France had more pipeline km per km², 0.0760, whereas Spain was way further: 0.0050. If we consider the data, together with the surface area of each country, we will understand the higher figures of subscribers per km² in France, compared to Spain: 9 and 0.7, respectively (12.8 times lower in the Spanish case).

Gas consumption levels per capita are also relevant: 42 m³ in France, more than ten times higher than in Spain (4). Differences persist in the analysis of gas per capita consumption in areas with gas supply: 81 m³ per capita in France, and 17 m³ per capita in Spain. Nevertheless, gas consumption per subscriber is not that different: 370 m³ per capita in France and 268 m³ per capita in Spain. Hence, we can conclude that differences in gas consumption between both countries were caused by the diffusion of pipeline networks in the territory, and by social penetration of that energy source.

7.4 Conclusions

Though France and Spain covered an area of similar extension, there were not that many similarities between them, in terms of energy (electricity and gas) consumption. In fact, the only common feature between them is that energy

consumption grew in both territories, despite the negative context provoked by the Wall Street Crack and the Great Recession. Such behaviour emphasises that the energy market evolved independently from global economic context. In contrast, there were two main differences between the Spanish and the French case: firstly, the Spanish Civil War had a deeper negative impact on electricity and gas consumption in the country. Secondly, the Spanish gas sector experienced a 48-year delay compared to the French, which not only conditioned the late evolution of the Spanish market, but also an insurmountable breach between the latter and the French market. Consequently, when electricity appeared in France, the gas sector was already powerful and consolidated, whereas in Spain it still operated within certain limits.

Thirdly, the last assertion cannot make us deduce that there is a correlation between development level of the gas industry and evolution of electricity. Considering the previously described characteristics of the Spanish gas market, one might think that electricity found it difficult to progress in France, given the resistance by the gas companies, and that Spain was "garden of Eden" ready for the success of electricity. However, things did not work that way: Spanish people with access to electricity were always below the French levels (88% vs. 97.6%, respectively), as were per capita production levels (137 kWh vs. 377.1 kWh). Therefore, dissimilarities between the two cases of study were due to other factors, namely consumption patterns, and diffusion of distribution and transportation networks. With regard to the former, in France most energy (gas and electricity) was consumed in factories, major energy consumers, and at home; in Spain, industrial uses of energy showed lower values. Concerning the latter, the gas and electricity networks were far more extended in France than in Spain, as a consequence of the configuration of a much more integrated French market.

Notes

1 Due to Spanish protectionism since the early twentieth century, French investors left the country gradually. The tendency accelerated as a consequence of British and French capital repatriation during the Great War and after it, as well as of the strong economic nationalism that Miguel Primo de Rivera's dictatorship exercised between September 1923 and January 1930 (Castro-Valdivia et al., 2019, pp. 51–74).
2 To know more about French urban demography and its evolution in the historical period that we study, see Pinol (1996, pp. 11–12).
3 In order to study French economy in the 1930s, see Borne and Dubief (1989, pp. 20–33), and Berstein (1993, pp. 25–51).
4 Hydroelectricity estimates can be seen in Maluquer de Motes (1987, p. 58). According to him, by 1930 it represented 23% of the overall Spanish electric sector.
5 Despite the lesser capacity of French hydroelectricity compared to Spain, France's hydroelectric production was one of the highest in world terms: it was the first in 1914. (Bairoch and Toutain, 1991, p. 22). For further details about hydroelectricity and thermoelectricity in the period that we study, see Morsel (1987, p. 102) and Barjot (1991, pp. 22–23).

6 To know more about electricity transportation and network connections in France, see Boune (1994, pp. 777–852).
7 In 1934, 5,086 Spanish villages had electricity, and only 48 had still gas energy supply (Martínez-López and Mirás, 2018, p. 91).
8 In 1937, Lisbon and Porto together accounted for 30% of Portuguese electric consumption, and 26% of the country's overall population in 1940 (Bartolomé Rodríguez, 2021, p. 68).
9 For a further analysis on electricity and gas consumption for lighting in Spain between 1926 and 1934, see Martínez-López and Mirás (2018, p. 93).
10 To study gas consumption in Spain between 1842 and 1935, see Fernández-Paradas (2009, pp. 108–131). For France, between 1840 and 1930, see Williot and Paquier (2005).
11 See Martínez-López and Mirás (2018, p. 97).
12 To study the advance of gas and electricity in Spain between the 1900s and the 1930s, considering the population of the villages, see Martínez-López and Mirás (2018, pp. 87–111).

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