Internationalization of Electricity Iberian Utilities and their Presence in Brazil

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1. Introduction

The power sector in most countries around the world has gone through huge institutional transformations since the 1980's. Encompassing these sectorial processes, global economic integration took place and many local companies became multinational, including also locally established electric utilities. More recently, under the pressures of the climate debate, new additional alterations are being required as traditional fossil-fuel electricity generation has to be replaced by other plants using non-emitting sources. Under these forces of change, not only new technologies are being incorporated; new players and new business models are replacing the old ones.

Promoting the electrification of diverse final uses and cleaning the electricity matrix are among the more important means to eradicate the greenhouse gas emissions in the energy sector. Although government actions are crucial to achieve these sustainability goals, the correspondent investments in the power sector are made by individual companies, private or state-owned, according to their business interests. The institutional framework should then be adjusted to consistently conduct their motivations and behavior towards the desired direction. But, independently of regulatory and economic direct stimula, the increased popular concerns about climate change are pressing the companies' stakeholders to develop clean policies.

During the second half of the 20th century a very strong growth of international trade and investment took place, and many companies moved some of their investments abroad, buying new assets and implementing greenfield projects, as observation of the sharp increases in the flows of Foreign Direct Investment (FDI)[2] indicates. The study of the creation and expansion of multinational companies has been the focus of many researches and a consistent, even if changeable, body of theory is now available.

In the power sector, as its business environment changed, many of the larger utilities, mainly the European ones, have also extended their operations abroad, replicating an internationalization movement[3] that took place at the early years of the last century, when the

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[1] NPII FGV

[2] UNCTAD – United Nation Conference on Trade and Development; FDI are investments made by the enterprises outside their original country without a financial nature. They often include the transfer of assets, knowledge, technology, etc, but always keeping the business control; even in the case of minority participation they involve some control rights.

[3] According to Hausman, Hertner and Wilkins (2008), at the early phase of the power sector, German and American manufacturers of electrical equipment were pioneers multinational enterprises. They were followed in the promotion of electricity by banks and other financial institutions, as by '…holding companies … linked with clusters of electric utilities, electric tramways, and related companies at home

traditional electricity business model was established. Despite that electricity has been considered a non-tradable product for most of the twentieth century, or at least only marginally tradable, the utilities themselves found now reasons to expand internationally, with the support of their knowledge and financial bases.

Among these companies, Spanish and Portuguese utilities, went to countries where new opportunities could be found, and created subsidiaries in Latin America, crossing the Atlantic Ocean, where cultural roots facilitated their expansion. Currently, more than twenty years after the start of this process, the Iberian companies are among the most active in Latin America, and directly involved in the process of construction of a cleaner electricity environment, possibly one of the most dramatic challenges faced today by the energy sector.

Examination of this internationalization process and its challenges towards a more sustainable world, even considering its specificities, reveals many aspects conforming to the theoretical expectations, including choices of where to enter, and advantages to exploit. Cultural affinities and Atlantic neighborhood were crucial elements directing this process.

Here we analyze some aspects of the Spanish and Portuguese companies' entry and expansion in Brazil – including Endesa/Enel, Iberdrola, and EDP. A brief presentation of the power generation structure and the sustainability challenges now faced by the power sector in these three countries preceded this report and can be seen in Pimentel (2020).

Although this study is oriented towards the Brazilian case, many observations about their motivations, possible logic and specific aspects can be extended to what has happened in other countries in Latin America, in general. A few comments on the rare reverse internationalization pattern, where a Latin American utility had, or at least had tried to, with little success, move abroad are also added.

Future challenges and international opportunities of new investments and of Atlantic cooperation are stressed.

As in many segments of life, even in the power sector, facing new opportunities, cultural bonds may be reinforced depending on the corporate choices and on the governmental support for these choices.

2. Iberian Foreign Direct Investments in Brazil and Latin America

Starting in the 1980's, there has been a huge increase in the foreign direct investments (FDI) around the world in general in the 1990's, accompanied by a correspondent increase in the

and abroad …. Rather remarkably, absent for most part were electric utility operating companies that extended over borders' (p. 273).

external operations of multinational companies. This process can be easily observed, looking at the evolution of the Foreign Direct Investments (FDI) as registered by the United Nations Conference of Trade and Development UNCTAD[4], as shown in Tables 1 and 2 below, indicating the flows both outward and inward in selected regions[5] for selected years. Even considering possible inconsistencies among these figures, double counting and omissions, they give us a very good estimation of the size of these flows and the role of the European and other developed regions.

Among the investment sources, it should be noticed the importance of the European countries, whose investments represented roughly a third of the total foreign investments in the period. Also, the flow of Chinese investments abroad should be highlighted, starting later, but growing sharply in the current century.

A larger part of these flows took place inside the developed region, including flows among European countries, Japan and United States, as the increase of integration in Europe should be responsible for an important part of these cross-broader investments. The internal European flows accelerated too as a result of the fall of communism, that opened opportunities in the eastern European region. Even considering all these exchanges inside developed regions, many other investments were also oriented to the developing world, in particular to Latin America, as it can be seen from the inward FDI in Latin America indicated in Table 2.

Table 1 – Foreign Direct Investments (FDI) – Outward – Selected Regions

(Millions of US$ current)

	1970	**1980**	**1990**	**2000**	**2010**	**2019**
WORLD	14,141	52,085	243,875	1,163,731	1,306,034	1,313,770
USA	7,590	19,230	30,982	142,626	277,779	124,899
CHINA (1)	-	82	3,278	54,995	154,617	176,240
EUROPE	5,095	23,116	122,160	849,256	633,524	498,775
L. AMER. (2)	21	432	1,364	8,212	54,697	41,589

Source: UNCTAD United Nations Conference on Trade and Development

(1) Including Hong Kong; (2) including Central America and Caribe

[4] Statistics available in unctad.org; as the FDI flows are presented in a net basis, negative FDI figures may occur in a few cases.

[5] FDI are expressed on a net basis (credits less debits, net acquisitions, and net incurrence of liabilities), as such, they can have negative values.

Table 2 – Foreign Direct Investments (FDI) – Inward – Selected Regions

(Millions of US$ current)

	1970	1980	1990	2000	2010	2018
WORLD	13,257	54,396	204,886	1,356,613	1,396,203	1,539,880
USA	1,260	16,918	48,422	314,007	198,049	246,215
CHINA (1)	50	767	6,762	95,296	188,106	211,506
EUROPE	5,226	21,787	102,715	711,465	485,694	473,113
L. AMER. (2)	1,509	6,303	8,523	79,788	160,670	164,236

Source: UNCTAD United Nations Conference on Trade and Development

(1) Including Hong Kong; (2) Including central America and Caribe

The evolution of the FDI received by most of the individual Latin American countries, corresponding to an increase of the multinationals (MNE)' operations, including Iberian ones can be seen in Table 3.

Table 3 – Foreign Direct Investment (FDI) - Inward – Selected Latin American Countries

(Millions of US$ current)

	1970	1980	1990	2000	2010	2019
ARGENTINA	90	678	1,836	10,418	11,333	6,244
BOLIVIA	20	47	67	736	643	-160
BRAZIL	392	1,910	989	32,779	77,687	71,989
CHILE	12	213	661	4,860	15,033	11,437
COLOMBIA	43	157	500	2,436	6,430	14,493
ECUADOR	89	70	126	-23	166	966
PARAGUAY	5	30	71	98	462	478
PERU	-14	27	41	810	8,455	8,892
URUGUAY	2	290	42	273	2,289	189
VENEZUELA	-23	80	778	4,701	1,574	934
MEXICO	312	2,099	2,633	18,249	27,131	32,921

Source: UNCTAD United Nations Conference on Trade and Development

As shown, these flows started to grow in the 1980's and reached higher values in the current century. The FDI' destinations were spread out along the whole region, but Brazil and Mexico were the main recipients, most of the time, whereas about a third of the flows were directed to Brazil, the preferred destination of many Iberian utilities.

For the three countries here being discussed, Brazil, Portugal and Spain, the evolution of the FDI flows both received and generated in these countries is presented in Table 4. Balancing inward and outward flows, Brazil and Portugal were net receivers of foreign investments, while the situation in Spain is more variable changing yearly, but, overall, receiving and exporting similar amounts of capital investments.

Table 4 – Foreign Direct Investments (FDI) – Inward/Outward – Brazil, Portugal and Spain

(Millions of US$ current)

	1970	**1980**	**1990**	**2000**	**2010**	**2019**
BRAZIL Inward	392	1,910	989	32,779	77,788	71,989
Outward	14	367	625	2,282	2,2060	15,515
PORTUGAL Inward	29	57	2,363	6,580	2,912	8,234
Outward	-	4	148	8,055	-9,456	-470
SPAIN Inward	222	1,493	10,797	39,575	39,873	12,406
Outward	49	311	2,685	58,213	37,844	24,135

Source: UNCTAD United Nations Conference on Trade and Development

The FDI here considered included corporate transactions and investment in greenfield projects. In Latin America the volume of foreign investments announced in new greenfield projects, as reported by UNCTAD in selected years in the current century, can be seen in Table 5. As in the case of inward FDI flows, again Brazil and Mexico have been the main recipients of these projects.

Chile, Colombia and Peru have also been among the favored destinations of the FDI, possibly reflecting their usually better institutional conditions. On the other hand, Venezuela, originally focus of large FDI flows, was losing ground as its political situation continuously deteriorated.

Although the greenfield values shown represented only announced projects and are not directly comparable to the FDI inward figures, looking at both figures they can give us an indication of the importance of the foreign investments in greenfield projects in Latin America, even if buying local assets seems to have been the preferred initial choice of internationalization in the 1990s by many companies, including the European utilities. More specifically, the Table 6

shows the evolution of the average five-year values of the Mergers & Acquisitions (M&A) with foreign capital, both in Latin America as a whole and in Brazil compared to the FDI inwards flow to Brazil in the same period.

Table 5 Value of Announced Greenfield FDI Projects – Selected Latin American Countries

(Millions of US Current Dollars)

	2003	**2006**	**2009**	**2012**	**2015**	**2018**
Argentina	5,803	3,255	8,624	5,868	2,816	6,957
Brazil	26,412	11,409	32,100	26,948	18,238	15,565
Chile	23,224	3,260	13,444	10,670	9,502	7,797
Colombia	8,869	1,317	2,909	3,055	2,474	5,687
Peru	4,342	6,642	10,564	3,174	912	5,798
Uruguay	301	1,200	248	588	218	184
Venezuela	7,476	3,082	1,075	312	113	109
Mexico	14,130	17,481	27,386	18,117	24,938	28,879
L. Americ. & Caribe	103,429	56,892	108,178	73,902	65,535	78,124

Source: UNCTAD – World Investment Report 2019, Annex Tables

Table 6 – 5-Years Averages FDI Inward and M&A Foreign Operations in Brazil and M&A in Latin America

(Millions of US Current Dollars)

PERIOD	**BRAZIL**		**L. AMER. & CAR.**
	FDI INWARD	**M&A**	**M&A**
1990-94	1,518,6	181.5	5,174.3
1995-99	18,324,7	8,687.0	21,863.3
2000-04	20,023.2	4,820.6	16,420.5
2005-09	27,776.0	3,276.4	10,109,0
2010-14	76,020.7	13,540,6	26,496,3
2015-18	57,767.7	16,415,0	31,025,5

Source: Calculated from UNCTAD – World Investment Report 2019

3. Power Sector Global Changes and Sustainability Challenges

During the last two decades of the twentieth century, after the turmoil created by the oil prices shocks of 1973 and 1978, an intensive institutional transformation of the power sector accelerated, with the privatization of state-owned utilities, and the introduction of competition in a sector previously considered a natural monopoly.

After a long period since the beginning of last century, when the use of electricity became widespread and scale gains continuously reduced costs, these very gains began to run out, facing the need of high and rigid investments, dealing with sinking costs and environmental problems. At the same time, a worldwide trend to reduce the State presence in the economic activities was taking course

In a state-owned company, it was easier to accommodate strategic goals and social needs, even with negative financial results, that allowed investments to be kept under difficult conditions. On the bright side, it allowed to deal with market failures, but on the downside, it made easier for interest groups who took over control of companies that became inefficient. Under the growing costs of the 1980's, the pressures for change converged simultaneously towards market liberalization and privatization.

The central argument for the introduction of competition and market operations was that, although the transmission and distribution of electricity are natural monopolies, generation and commercialization are not, and competition could be introduced in these segments with adequate rules and creation of proper markets.

These changes took place in numerous countries, each with its own specific characteristics but always increasing competition. Probably, the first world power sector restructuring experience took place in Chile, with the unbundling of generation, transmission and distribution and a complete privatization, starting in 1982.

The main world paradigm was the transformation of the UK system, similarly to the Chilean experience, with the fragmentation and privatization of the monopolist state-owned company[6] and the introduction of competition, initially in the wholesale market and progressively reaching the retail sales. This process resulted in a reduction of operational costs and facilitated the closure of many coal plants – as the less efficient domestic coal mines - and the growth of natural gas generation.

[6] In 1957 the UK nationalized its power sector and created the Central Electricity Generating Board (CEGB). As it was centralized, it was easier to restructure and privatize after 1989. The company was broken in smaller utilities, but the transmission grid was kept integrated under the National Grid Company.

The development of new gas turbines aero-derivatives in the 1970's was an important additional factor to motivate the liberalization of the generation markets, facilitating the replacement of less competitive coal and nuclear units.

Another different model of restructuring took place in the United States, where the individual States are quite independent with specific local legislation, and where most of the utilities were already private from the start. The main sectorial changes were basically related to the introduction of competition in both wholesale and retail. The institutional transformations were also followed by an increase in Natural Gas generation and the transformations took different paths; the regions with highest prices (sometimes with stranded costs of nuclear plants) being the first to incorporate the new competitive rules[7].

Examples as the above multiplied, and this kind of transformations expanded worldwide. After many years of relative global stability, the sector structure started to change sharply everywhere with new commercialization models, privatization and internationalization, as detailed by Hausman, Hertner and Wilkins (2008) indicating that a "full circle" was being completed[8].

In the European Union, liberalization[9] started relatively late and happened in most members at different speeds, as each individual power sector had previously a different structure. Besides the introduction of competition, another important goal was the creation of a single market. Articulated through European Commission directives and coordinated by the European Regulators' Group for Electricity and Gas (ERGEG), the process has been following a bottom-up approach, as seven Regional Initiatives, including different sub-groups of countries, were created to promote the electricity countries' markets integration.

Considering the transformation in the European electricity market in general, it can be said that it involved initially four main interrelated ongoing processes: (1) restructuring, with

[7] According to Joskow (2000) pp. 41, 'The stimulus for more fundamental industry structure, regulatory and competition reform came from California and a small set of pioneer states with relatively high electricity costs (and associated stranded costs) and a substantial Qualifying Facilities / Independent Power Producers presence' as under the oil price peaks, more expensive nuclear and alternative fuels received long range contracts. Also, according to Joskow, the higher generation prices in the US, before the reforms, were in the US$ 60-70 / MWh range, while the competitive prices of the new gas generation was around US$ 25-35 / MWh.

[8] Hausman, Hertner and Wilkins (2008) in pp. 262 '…After the long process of domestications, which included numerous nationalizations of electric utilities … the political landscape shifted rather dramatically in the late 1970 and early 1980s. and in pp.274 '… with globalization, privatization, restructuring and deregulation, and a new emphasis on "markets", a new wave of multinational enterprise activities began in the electric utility sector…'.

[9] Danwitz (2006) discusses the liberalization of the European electricity power sector, as the 'abolition of the rights of monopolies" and points to the large previous differences in many countries, as typically among the German, France and United Kingdom systems. The case of France is interesting, because more than a sectorial question its structure was related to the obligation to serve and to the conception of public service as an element of the French identity.

introduction of competition, unbundling[10] and market creation (2) an increase in the electricity trade and progressive integration of the individual countries' markets towards a single internal market, (3) an increase in investments outside the countries' borders and the internationalization of utilities, and (4) a large number of privatizations, mergers and acquisitions, changing the corporate environment, although individual countries have reacted very differently (see for instance, Danwitz 2006).

Spain and Portugal were among the first countries to set up an integrated coupled market, MIBEL, inaugurated in 2007. They progressively introduced competition in their wholesale electricity markets, since the edition of Directive 96/92 in 1996, transforming their prior vertically integrated structures. MIBEL is a coupled market, integrating both countries, considering their transmission limitations, built after a sequential approximation between their national system operators. Currently, MIBEL negotiates the joint day-ahead electricity sales and is also coupled with other European markets, as European power integration is slowly moving ahead.

The Iberian supply mix has been also changing, according to the institutional transformations. Since the 1980's, Portugal and Spain had sharply reduced their dependence on oil imports for electricity generation, replacing it by imported coal and natural gas. Spain had also developed a few nuclear plants, but after Chernobyl and Fukushima this program lost momentum and was blocked. Now coal is also being abandoned, as climate issues are gaining momentum. Natural gas and renewables, complemented by a few hydro pumping-storage units, are the main generation sources growing in both countries.

Brazil as most of Latin American countries also underwent similar transformations as far as the liberalization and privatization processes are concerned. But, given the historical predominance of hydro plants[11], it has developed particular methods to run its system, dealing with its seasonal variations and optimizing its operations, with different rules than those in most countries, even in South America.

In 1995, new legislation turned licensing of new plants in Brazil a competitive process, introducing competition in a previously free governmental choice. State-owned companies were compelled to invest in new projects only as a minority partner with private agents. Instead of regulated prices, the generators started to sell electricity at the prices established through the competitive process. The traditional cost-of-service system was replaced, and new legislation and regulation issued in 1998 created the bases of a new model.

[10] It should be noticed that the unbundling of the power sector replaced hierarchical relationships by contractual ones; see for instance Milgron and Roberts (1995) or Wiliamson (1975). Another energy sector – the oil sector – did not suffered similar pressures in order to increase competition and most big oil companies remained verticalized, see Mitchell (1976).

[11] See Cachapuz (2006)

Formal markets were not created, as the Brazilian power operation system, predominantly based on hydro plants, was maintained. As before, the whole system is centrally operated by the National Systems Operator (ONS), using a mathematical algorithm based on total costs, independently of business negotiations. The option for an an eventual daily competition was discarded in favour of the system optimization. Hydro plants have also a compensation system that determines their commercial rights, independently of their actual operation.

In 2004, a complementary legislation introduced a set of auctions to supply the expected demand of the regulated distribution companies. Apart from the regulated market, the generators and larger buyers can buy and sell independently by negotiated prices, contracted among them in the so-called free market.

A clearing house manages the daily sales. Energy supplied without contracts, in both regulated and free markets, are sold through short-range 'optimal' prices, based on the marginal costs calculated by the ONS.

After a long previous period of disorganization of economic life and high inflation, during which the vast majority of state-owned companies survived through governmental support, the institutional changes came together with the country's financial stabilization, and the new rules guaranteed the preservation of tariffs and contracts. In this new context, privatization happened together with the implantation of the new regulatory model. Most of the distribution companies and part of the generation were rapidly privatized, and the Portuguese EDP, and the Spanish Endesa and Iberdrola were among the international utilities that bought local assets.

Currently, this design of the Brazilian regulatory system is slowly changing again, as new rules are allowing the non-regulated market include smaller and smaller consumers. Also, the ONS is currently computing hourly generation costs for around 7,000 different locations; next year, they will be used to determine different marginal costs, that can establish a set of new hourly prices for the short-term 'market'.

The substitution of the current system by a day ahead market and the use of prices instead of costs to govern its operations, has been proposed in Brazil but is still the object of many controversies. As a larger proportion of the current regulated market moves to the free market and the long-range contracts auctions loose force, it may become a possible step. The current discussions in Brazil seem to suggest that changes in the future institutional model may incorporate separate remunerations to demand supply capacity and to the energy generated and new marketing strategies may be required.

In most of the world power sector, as in the Brazilian one, apart from the four transformation forces already at work, as in the European context (liberalization, integration, internationalization and privatization), with less emphasis in cross-border integration, it has been added a fifth important one: (5) the need to make effective efforts to clean the energy matrices, fighting global warming.

The introduction of wind and solar, in smaller units than the usual plants that dominated the sector, brought a large number of new players, associations and lobbies to the sectorial institutional field. Industrial equipment producers and their supply chains started new businesses, and new technological opportunities have been opened. The hourly mismatch among the energy needed and the supply available are forcing the differentiation of hourly prices, and the consequent valuation of energy stocks in batteries and/or pumped storage reservoirs.

In a smaller scale, the cost reduction of the solar panels resulted also in an increase of the (distributed) solar generation directly by small residential and commercial consumers, requiring new commercialization rules, a different use of the distribution grid and creating a new category of "prosumers" – consumers able to produce electricity.

4. Internationalization of Iberian Electricity Utilities

4.1 Internationalization of Electricity Utilities

In synthesis, enterprises internationalize in order to create value; often exploiting their specific resources and competences, including their knowledge and other intangible operational assets. In a few cases, they internationalize looking mainly for 'legitimacy' (see Meyer and Rowan, (1977)) or motivated by political reasons.

In the last decades, a large theoretical body on internationalization of multinational enterprises (MNE) and its motivations has been produced. Since the seminal work of Ronald Coase in 1937, pointing the role of transaction costs, thoroughly developed, among others, by Williamson (1975), most studies about the firm were focused on its border and the comparison between hierarchical and market costs. When a company extends its size to operate through its country borders, it faces a more complex case than the traditional verticalization[12] problem, as it has to choose between property and hierarchical control versus market operations that are usually expressed through complex contractual relationships.

Currently, the main stream of internationalization studies seems to be following the

[12] About verticalization see for instance Joskow (1993) and Hart (1995).

internalization theory, rooted on the comparison of the market' costs for intermediate goods with the transfer and management of these resources (internalized) in the interior of the company (as discussed by Narula et al (2019)). The more knowledge-intensive the intermediate goods are, more efficient seems to be its internalization. Teece (2014), aggregates to this theory additional dynamic considerations, highlighting the companies' capabilities and the possibility of creation and co-creation of new markets[13].

The choice of location is an important decision to be made by the companies moving abroad. Institutional conditions, physical and cultural proximity seems to be among the main factors defining the limits of this choice. Cantwell (2009) draws attention to the importance of identifying the adequate location, as a company moves abroad. According to Cantwell, this factor was overlooked for a long period and the interest in these issues needs to be resumed. Even the technology transfers and creation, inside MNEs, depend on the possibilities of the local subsidiary.

It may be helpful to use Dunning Eclectic Paradigm (Dunning (1998), Dunning and Lundan (2008), Lundan (2010)) to analyze internationalization processes, as it gives us a broad classification of the main factors involved: ownership (O), Location (L) and Internalization (I), respectively related to the advantages associated to the ownership of the firm, to the choice of location to operate, and to the advantages of internalization. These various components are compatible with the theoretical approaches of most other authors[14] analyzing the globalization of enterprises. The ownership advantages can be also divided in Oa, property rights advantages, Ot, common governance advantages and Oi, institutional advantages.[15]

The internationalization of electric utilities can be seen as part of this global pattern, but it has very specific aspects that are pointed by Hausman, Hertner and Wilkins, 2007, in a very complete analysis of the global evolution and ownership of multinational electricity companies in the period 1878-2007.

When the electricity business became a feasible proposition at the beginning of the 20th century, the MNEs were also starting to spread and grow. Financial capital and producers of electricity capital goods were involved in the expansion of production and use of electricity throughout the world. In this expansion were involved both utilities, moving abroad to use their central core competencies developed at home, as free-standing companies, created exactly to

[13] See Pitelis and Teece (2010) and Cantwell (2014).
[14] The Eclectic Paradigm is compatible with many of the existing theories of business internationalization. Dunning and Lundan (2000), in pp 108 point that: '… it could be argued that the paradigm is less an alternative theory of international production than one which pinpoints the essential and common characteristics of each of the mainstream explanations.'
[15] This classification was employed by Pimentel and Feleppa (2013), to analyze the efforts towards internalization of the state-owned Brazilian company, Eletrobras.

expand electricity investments abroad, somewhere in the middle between direct and portfolio investment. In the case of the utilities, few worked directly but trough the creation of holding companies that controlled the process.

The evolution of the participation of foreign capital, as pointed on Hausman et all, reduced sharply from 1913 to 1972 around the world, being close to zero during the 1970's in Europe and in most developed countries. In Latin America, the nationalization process was slower than in the rest of the world, but in 1972, foreign ownership of utilities had also been sharply reduced for most countries in the region. In contrast, many state-owned firms around the world (except in the US) were the main electricity suppliers before the new transformation waves of the 1980's when the private capital was back at the electricity supplying business.

A very detailed presentation of the main international utilities operating in 2013 was made by Hall et al (2013). They identified 29 companies operating in more than one country at that year. Some of them operated only in their region of origin, but many had a broader range of countries. European utilities moving abroad the European region itself, typically operated in North and Latin America, and some of them in the Asia-Pacific region. More than half of these international utilities were state-owned. The Italian Enel, the French EDF[16] and Engie[17], the Portuguese EDP[18] and the Spanish Endesa[19], Iberdrola and Union Fenosa were among the first and foremost European companies among them. At that time (2013), Chinese state-owned companies were already in expansion.

In many cases, this internationalization was accompanied by the advancement of new renewable technologies, wind and solar. Currently, the Chinese utilities have sharply increased their presence in the world, including in Brazil, where China Three Gorges (CTG) bought Duke Energy assets in the country and has 8,282 MW installed capacity, and State Grid bought the Brazilian CPFL Energia, and some transmission assets from a Spanish group. State Grid has also involved in some huge transmission lines greenfield projects. The Chinese are the main global suppliers of solar panels and are present in Brazil through BYD and Canadian Solar (Chinese capital).

Apart from the European and Chinese utilities that are dominating the present wave of international expansion, a relatively few North American and other Asian companies are also investing abroad. In the United States, structural reasons kept during many years its electric utilities verticalized and local. In the 1930's, in order to limit some abuses, specific legislation prohibited the existence of groups of utilities under holding companies, and also the ownership

[16] Électricité de France – EDF.
[17] Result of the merger of Gas de France and Suez.
[18] Eletricidade de Portugal – EDP.
[19] Endesa, was posteriorly bought by Enel, beaming part of the Enel Group.

of foreign investments. Only with the Energy Policy Act of 1992, restrictions were lifted, and companies could begin to own generators outside their own territories and to purchase participation in foreign power utilities. Possibly due to these historical roots, most of the US utilities have not invested abroad. Only a few have tried, but often sold later their international assets. Even so a few investors have entered in greenfield projects and one of the largest US utilities is still active around the world – AES[20], with assets in many countries, including 3,348 MW generating plants in Brazil.

In other regions, few countries engaged in international expansion. Among the Latin America companies, only the Colombian ISA[21] has already made substantial investments abroad, as other local companies, as the Chilean Colburn and the Brazilian Eletrobras, were restricted to preliminary international investments.

Following the new renewables growth, as the Chinese have installed industrial plants in Brazil, important international wind turbines producers have industrial plants in the country, as Acciona, Siemens-Gamesa, Alston-GE, Vestas and Woben, dividing market share with the local company WEG.

4.2 The Internationalization of the Iberian Utilities in South America

Among the Iberian MNEs investing in Latin America after the 1990`s were the electricity companies. A parallel process in Europe and Latin America favoured these movements in the power sector.

In Europe, the pressures for integration and increase of competition menaced the previous solid local positions of the main Spanish and Portuguese electricity utilities, having to face competition at home with other important European players[22].

In Latin America, and particularly in Brazil, without the integration forces, the liberalization took place a few years later, with the exception of the pioneering changes in Chile. As a result of this global process, the international Iberian utilities – Endesa (now part of the Italian Enel Group), Iberdrola and Eletricidade de Portugal (EDP) - conquered larger market shares in Brazil. In all these three cases, the convergence between the European and Latin

[20] AES Corporation, originally an important independent power producer (IPP) in the United States, founded in 1981, became one of the few global utilities with presence in many continents, both in the generation and distribution, including the ownership of wind and solar assets.
[21] Interconexión Eléctrica S.A. (ISA)
[22] The Directive 96/92/EC of the European Commission imposed a minimum of 30% of the local markets to be opened to European operators, and the local companies should reduce progressively their market share in order to have new operators entering the Spanish market in 2007, later anticipated to 2003 by the Real Decreto-ley 6/2000.

American waves of liberalization are among the main factors promoting their expansion in Brazil.

Endesa/Enel[23]

Endesa was founded by the Spanish government in 1944, and in 1997 it was the largest Spanish utility as a new legislation initiated the liberalization of the Spanish power sector. Subsequently bought by the Italian Enel, Endesa/Enel was among the more aggressive buyers of Latin American assets, even if arriving relatively later for some of the local privatizations.

Actually, one of the first internationalization movements in Latin America was made not by any European utility but by the Chilean company Endesa (with the same name as the Spanish one, but originally unrelated): Chile, in 1975, was the first country in the world creating a wholesale market and introducing competition among the generators. Suffering the required adjustments through this process, its main utilities at that time, Endesa and Chilectra, later both privatized, had, since an early beginning, accumulated experience on how to survive and operate in this new competitive environment.

In the sequence of transformations of the Chilean power sector, Chilean Endesa was initially broken in smaller parts to facilitate its privatization. In this period, it lost its governmental functions and building sectors, reduced costs, increased its operational efficiency[24] and had to look for new financial sources. Even as a state-owned, it was restructured as a multidivisional[25] company, coordinated by a holding with its main businesses lines separated along different divisions, now especially focused in the generation and in the transmission sectors.

Also, Chilectra, the largest distribution company was restructured, progressively privatized and had its control kept in the hands of a holding company, Enersis, created in 1985 (and reorganized with this name in 1987).

Along the privatization process, through a sequence of capital operations, both Chilectra and Endesa became controlled by the holding Enersis. Its complete privatization occurred only in 1998, but before that, even as a state-owned company, Enersis, positioned to take advantage of the liberalization of other Latin American countries, that occurred after the Chilean experience. In 1992 Enersis invested in two generation plants in Argentina[26], crossing the Chilean borders for the first time, and in 1995, bought a generation company in Peru.

[23] Although Endesa was bought by the Italian company Enel, it is still treated here as a 'Iberian utility' as it remained with a significant presence and corporate basis in Spain.
[24] See Sol (2002) for a detailed discussion of the transformation of Chilean Endesa.
[25] See Chandler (1961) about the emergence of the multidivisional form in the twentieth century.
[26] See Brenes et al (2000) to the initial internationalization of the Chilean Endesa.

In 1996, Enersis, now in partnership with Spanish Endesa, with the Portuguese EDP and with other local investors, taking advantage of the privatization process in Brazil, bought 70% of the distribution company supplying the interior of the Rio de Janeiro State, Cerj (with around 2.3 million consumers), later denominated Ampla. In 1998, again in partnership with Endesa and other investors, bought 51% of the distribution company of the State of Ceara, Coelce (around 2,5 million consumers). Also, in Brazil in 1979, Endesa Chile bought 79% of the hydro plant of Cachoeira Dourada (658 MW) and in 1998, was selected as a leader of a consortium (CIEN) to replace Enron and built a 1,100 MW transmission line and frequency conversion to interconnect Argentina and Brazil that entered in operation in 2000 and was later duplicated in 2002.

With its large Latin American position, Enersis and the Chilean Endesa, after heavy investments, became themselves the focus of many external utilities' interest, also going through internationalization processes. Through a sequence of steps between 1997 and May 1999, Endesa Spain[27], increasing its participation in these Chilean companies, was able to buy the control of both Enersis and Endesa Chile, consolidating its presence in South America. It should be added however, that Endesa Spain lost some of the advantages of the initial direct privatization sales, as Enersis made the initial movements and as such was able to profit from them.

Previously, Endesa had already bought a few local assets, and its portfolio grew with the addition of Enersis. To reinforce its financial position and reduce its debts, Endesa promoted the sales of some non-energy assets and even some energy ones, as it was the case in the Dominican Republic and in Caracas (Venezuela). It also sold its 10% participation in the important Chilean transmission company Transelec, concentrating its activities in its core businesses of Generation and Distribution[28]. In this way, Endesa established an important presence in the power sectors of Argentina, Brazil, Chile, Colombia and Peru.

In 2005 again, the cycle of changes took place, and it was when the Spanish Endesa became the object of desire of stronger corporations (see Marcos (2012)). Initially, Gas Natural, a Spanish company based in Barcelona, launched a bid to buy the Endesa shares, that was successfully refused and blocked by Endesa's board, even as Gas Natural had some support from the Spanish Government for the formation of a "national champion". Another competitor appeared and, in 2006, E.ON a large German utility made an alternative and higher bid for the Endesa shares. In parallel, Acciona, a Spanish building company, bought in various steps 21% of the Endesa' shares, while Enel, the Italian state-owned utility, bought 25%. Together they were able to negotiate an agreement with E.On, including a subsequent sale to E.ON of other

[27] See Trillas (2001)
[28] Except by the control of the Argentina-Brazil interconnexion.

European assets in Turkey, Poland and in others countries. A new Enel-Acciona bid was then successfully accepted by most of the Endesa shareholders. In this process the value of the company almost doubled.

With this new operation Enel/Endesa's position in Latin America grew again adding some Enel international investments to the strong position of Endesa in Latin America. Later, it reinforced a sustainable drive, as Enel was strongly oriented towards new renewables. In December 2008, Enel created a subsidiary Enel Green Power (EGP), focused in the creation of an important portfolio of wind and solar projects, concentrating the renewables developments of Enel/Endesa around world.

Starting with wind and solar investments in Italy itself, EGP diversified and reached many countries with wind projects for instance in South Africa. Mainly in Brazil and Chile, but also in Peru, Guatemala, and Mexico, in Latin America. Currently, EGP has 49,834 GW renewables installed capacity around the world, including 28,134 hydro, 15,300 MW wind and 5,430 MW solar.

With the powerful support of the Italian Enel, the company bought in Brazil two other distribution companies, in 2016: the medium size Celg, supplying the State of Goias, and in 2018, the larger Eletropaulo, in the State of S. Paulo, one of the largest distribution companies in Brazil

As such, Enel/Endesa is presently involved in Brazil in the Distribution and Generation businesses[29]. Apart from the distribution companies: Enel D SP, former Eletropaulo (7.3 million consumers), Enel D Goias - Celg, (2.7 million consumers), Ampla (2.7 million consumers) and Enel D Ceara - Coelce (3.7 million consumers) Enel has currently almost 3,000 MW generation capacity installed, being 1,270 MW hydro, 842 MW wind and 820 MW solar.

Looking to the future, Enel keeps investing in renewables, including in solar. Recently it started to build the very large solar plant S. Gonçalo in the State of Piaui, with 475 MW of capacity. It is also operating in solar through the Build-Sell-Operate (BSO) model in order to liberate resources for additional expansion. One such example was the sale of 3 plants (Nova Olinda, 292 MW solar, Lapa, 158 MW solar and Cristalandia, 90 MW wind) to the Chinese company Energy Investments Holding, last year in Brazil.

Iberdrola

[29] Besides the CIEN assets that although underutilized could play an important future role, if the South America integration starts moving again. It should be said that its costs in Brazil have been partially covered as its transmission lines are considered part of the Brazilian 'Rede Basica' that receives a fixed remuneration.

The second Spanish electricity company to expand its activities in South America was Iberdrola, possibly the foreign company with the largest presence in Brazil nowadays. Iberdrola is a private company founded in 1992, as part of the Spanish electricity sector restructuring, by the fusion of two companies, IBV Iberduero y Hidrola, to face up to the Endesa growth in Spain, planning to be a global multisector operator, in the electricity, gas, water and telecommunication sectors. Among its main shareholders is the building company ACS and the BBVA bank.

As Endesa, under the menace of the competition of other larger electricity European players in Europe, Iberdrola[30] decided to move abroad and initiated its operations in Latin America, even before its formal constitution, in 1992, in Argentina, as part of a consortium including Duke Energy that bought the control of the thermal power plant of Guemes and a gas distribution unit, both sold back later (in 1999). In 1995 Iberdrola took control of Electricidad de La Paz and of Luz y Fuerza Eléctrica de Oruro, both in Bolivia. In 1996, in partnership with the Belgian Tractebel (a Suez subsidiary) and local groups, bought 51% of the generator plant of Tocopilla in Chile, and the control of UHE Colbún (585 MW).

In 1997 Iberdrola was part of the consortium Guaraniana (with the largest Brazilian pension fund Previ, and the state-owned Banco do Brasil) that took part in the privatization of distribution companies in Brazil and bought the control of the distribution companies Coelba and Cosern, and the hydro plant of Itapebi (450 MW).

Following its planning entered in sequence in many infrastructure businesses in Brazil, Mexico, Colombia and Guatemala. But, after 2002, it changed its orientation focusing in the modernization of the electric sector, renewables and combined cycle gas generation concentrated its operations in Latin America in Brazil and Mexico, while growing internationally in other regions, buying Scottish Power in 2007, and Energy East Co in the US in 2008. With the acquisition of Scottish Power[31], Iberdrola became an even more important European player and as the company had important wind assets in US, adding Energy East to its portfolio left Iberdrola among the main wind developers in the US at that time.

In 2020, there was a change in the Neoenergia' shareholders, as Banco do Brazil sold its participation trough public auctions, and at the end of the operations Iberdrola controls Neoenergia with 51.4%, Previ remains with 30.2 % and the company has a free float of 18.7%.

In 2020, Iberdrola concentrated its presence in Brazil through Neoenergia, with four distribution important local companies – three in the Northeast region: Coelba (6.0 million consumers), Cosern (1.4 million consumers), Celpe (3.7 million consumers) and one in the State

[30] See Rozas-Balbotin (2008b) for a detailed discussion of the internationalization of Iberdrola.
[31] According to Schulke (2010) 'the acquisition of Scottish Power had the additional effect of reducing the risk of a hostile takeover of Iberdrola…'.

of S. Paulo: Elektro (2.6 million consumers), the latter, bought still in 2011, previously part of the Enron assets.

In the generation business Iberdrola/Neoenergia has the control of many plants with 4,020 MW installed capacity, in renewables and combined cycle gas plants: including the hydroelectric pants of Teles Pires (1,819 MW), Itapebi (462 MW), Baixo Iguaçu (350 MW), Baguari (140 MW), Dardanelos (232MW) and the CCGT Termopernambuco (533 MW). In addition, Neoenergia has also a minority participation in the consortium that built the run-of-the-river UHE Belo Monte (11,233 MW) one of the largest plants in Brazil.

Considering renewables, Neoenergia has 17 wind parks with 516 MW installed capacity and another 27 parks under construction with another 1,038 MW. It has not in the moment any large centralized solar plant development in Brazil, what may represent at least a delay in its future positioning in the country, contrasting with around 700 MW solar PV plants already built by Iberdrola around the world, being more than 500 MW only in Spain.

EDP

The third Iberian electricity company with a large involvement in Brazil is Energias de Portugal[32], (EDP), controlled initially by the Portuguese Government and founded in 1976, as a result of the merger of 13 smaller companies. Operating in the generation, transmission and distribution had growth as the more important electric utility in the country and in 1980 was already supplying 97% of the Portuguese consumers and generating around 80% of the local load.

In 1996 EDP, under similar pressures as the other Iberian companies, took its first step in the internationalization process, buying with Endesa Spain and Chilean Enersis, as above mentioned, the control of the Brazilian Cerj (now renamed Ampla). As a minority partner it didn't keep longer these shares (a 7.7% stake), that were later sold in 2011 to Endesa. But in 1997 EDP continued to grow in Brazil and bought 25% of the hydroelectric plant UHE Lajeado (902 MW). Later, in 1998, in partnership with the local utility CPFL, bought the control of Bandeirantes (1.9 million consumers) one of the distribution companies created by the restructuring of the electric sector of the State of S. Paulo.

At home, EDP started to be also privatized through a sequence of market sales, under a very special corporate design, allowed by the Portuguese legislation, preventing the took over by larger players and keeping a strong governmental influence in its board's decisions. An initial sale of 30% of the company' shares in 1977 and a sequence of other later sales over the period 1998-2005 reduced the Portuguese government participation to 26%, without changing much its governance.

[32] Originally called Eletricidade de Portugal, was later renamed Energias de Portugal.

The EDP internationalization process however was kept in movement with main operations in Brazil, Spain and United States. EDP expanded also in the gas distribution business for the regulated market both in Portugal and Spain, following a multi-utility strategy in vogue at the 1990's. The gas operations are conducted through a subsidiary created in 1994 and renamed as EDP gas in 2014 to reinforce its brand.

Continuing its expansion in Brazil, from 1998 onwards, EDP bought, along the years, participation in many generation plants, including 60% of the hydroelectric UHE Peixe Anglical (499 MW), 50% of UHE S. Antonio do Jari (393 MW), 100% of UHE S. Manuel (700 MW), UHE Mascarenhas (198 MW) and UHE Cachoeira Caldeirão (219 MW), as the thermal coal plant of UTE Pecen (720 MW).

In the distribution business in 1999, EDP bought from a pool of Brazilian investments banks the control of Iven, a vehicle that in partnership with Brazilian pension funds had launched a successful bid in 1995 for the privatization of a distribution company, Escelsa (1.5 million consumers) of the State of Espirito Santos. As EDP bought also from Iven additional shares of Escelsa, with the end of a previous shareholders agreement in 2002, EDP took the full control of the company[33].

Escelsa had also the control of Enersul (0.7 million consumers) in the State of Mato Grosso do Sul, bought in 1977; now EDP had the control of both Escelsa and Enersul. Later, however, through a swap with the local Grupo Rede, EDP exchanged the Enersul shares by the full control of the UHE Lajeado.

In 2005, EDP Portugal directed its generation expansion to renewables, particularly to wind parks whose prices became competitive and created the EDP Renovaveis (EDP R), a subsidiary with emphasis in wind power, with projects in Portugal and other European countries, and in Mexico, Brazil and Colombia. EDP R bought also one of the largest US wind generators at the time, Horizon, adding around 3,000 MW capacity, and incorporating the Horizon' wind parks managerial experience.

In 2011, finally concluding its long privatization process, the Portuguese Government offered to sell 21% of EDP shares, keeping only 5% of their 26% shares.

It should be noted that EDP shares were of two classes, with the 21% being now sold of type B with full voting rights. The remaining 74% shares already sold, were of type A and any individual shareholders, independently of the number of shares held, had its voting rights limited to the 5% of total shares.

[33] Political factors involved in the internationalization of EDP in Brazil, are discussed by Fernandes et al (2012).

In order to keep as much as possible diluted the EDP' control, the winner of this new bid, cannot buy any other share to the limit of 25% or sign any agreement with other shareholders for at least the following four years. It should be added that by law in any change of control, the interested buyer exceeding 33% of the company had to offer the same condition to all existing shareholders interested in tagging along, what would make this operation quite expensive.

In 2012 many companies became interested in acquiring the EDP' shares and participated in a sequence of negotiations (instead of a single bid); at the end only Brazilian Eletrobras and Chinese utility China Three Gorges (CTG) were in contention to buy these shares. With the support of a larger source of capital, CTG won, assuming an important participation in the EDP Board, and having access through EDP both to the Brazilian market and to the wind generation expertise. CTG formerly was basically a hydro company (owner of the impressive UHE Three Gorges) with only 200 MW of wind capacity installed at the time.

In Brazil EDP, now reinforced by the cooperation with CTG, besides the new wind parks being developed by EDP R, kept looking for new opportunities in the power sector and in 2016 won several bids for building new segments of transmission lines. As a result, is building 1,300 km of new lines. In the following year, 2017, EDP took a further step to increase its distribution business and bought 33% of the voting shares of Celesc, a state-owned utility supplying the State of Santa Catarina that may be the object of a future privatization

Giving priority to a renewables's portfolio and the expansion of wind generation, besides its more traditional distribution activities, EDP as a whole reached the end of 2018 in the world as a multinational company, present in 19 countries supplying 9.8 million customers, with a very clean generation installed capacity of 27,000 MW, of which 73% renewables – 41% wind and 32% hydro – and 14% if CCGT natural gas.

Although in Portugal and Brazil EDP distribution companies are promoting and commercializing solar distributed units for its customers, it seems to be slower that their competitors in the field of centralized solar generation. As the installation of solar centralized plants is growing around the world, EDP does not seems to be following this trend in Brazil.

Eletrobras

As the three above electricity companies have established themselves during the last thirty years as international companies with a firm presence in Brazil and in some other countries in Latin America, operating in many regions of the world, local Latin American companies were not able to follow the same path.

Contrasting with these experiences, the case of Eletrobras, the Brazilian state-owned company, discussed in Pimentel and Feleppa (2012), even if unsuccessful, gave us a different

point of view, with similar motivations, looking now the internationalization of electric companies from Brazil. While most of Eletrobras efforts were pointed to other Latin American countries a reverse movement was also tried, crossing the Atlantic in the opposite direction towards the Iberian Peninsula, as discussed above, bidding for a participation in EDP.

Eletrobras[34], is a public company controlled by the Brazilian federal government with 32.8% of its capital in the hands of minority shareholders and has its shares listed in São Paulo, New York (ADR) and Madrid. Eletrobras owns and operates, isolated or in partnership, 30% of the Brazilian generation system, and 54% of the high voltage transmission. Originally operating exclusively domestically, except for the development of hydro power plants on bi-national rivers, as was the case of Itaipu (14.000 MW) in a partnership with Paraguay. Eletrobras was founded in 1962 and was the main responsible by the expansion of the generation and transmission of the Brazilian system since then. It had also a smaller involvement with the distribution business, but with the liberalization of the power sector, its distribution companies were privatized.

It has been structured as a mixed X-Form Multidivisional in the Williamson (1975) classification, mixing strategic and operational and functional functions in the holding, a questionable situation according to Williamson. In fact, in the past, Eletrobras was never a typical multidivisional, as the holding was extremely involved in governmental functions and the divisions were under regional political influence operating more independently than in the typical case.

With the liberalization of the Brazilian power sector, started in 1995 the need to restructure the company was overwhelming. The regional division of tasks lost most of its validity and instead of automatically assuming the full ownership of new projects, Eletrobras had to bid, in a minority partnership with private investors, to get the concessions of any new plants through special purpose companies, to avoid the restrictions and lack of flexibility imposed on the state-owned companies (SOE).

Even so, the internal changes were minimal and any efforts to restructure the Eletrobras group, giving new focus to each of the subsidiaries, were frustrated by the political conditions. Currently this situation is been revised, but more radical changes will wait for the full privatization planned by the current administration.

As a SOE, Eletrobras was created by law that did not allow the company to operate in other countries. In 2008, however the Congress changes this law and opened the possibility to Eletrobras to have assets abroad. In 2008, many of largest international players were already

[34] Centrais Eletricas Brasileiras SA – Eletrobras

investing and competing in Brazil, further reducing the Eletrobras' space for growth, that had already been impacted by its new policy of entering always as minority partner in new projects,

At the same time, Brazilian construction companies had become international companies and they were looking for large power projects abroad. Some of these projects intended to export electricity to Brazil (but not all of them), and in most cases they have tried to involve Eletrobras to include its knowledge of hydro projects and integrated systems, to share the risks and to reach a country-to-country type of rapport that would be facilitated by the direct involvement of a federal company. Their political influence in Brazil helped to reinforce the internal pressures to expand the company's horizons. The relationship between the company and the construction companies that on one hand was a positive and helpful way to prospect new opportunities, at the end, as the wave of corruption reached these companies and the government officials, it was one of the main reasons to block this internationalization process as this public-private relationship fell apart.

Starting in 2008, Eletrobras created a new internal division to coordinate and articulate the process and its staff included some key people coming from the subsidiaries with direct experience in the construction of large plants and transmission lines. Additionally, new types of knowledge and capabilities needed to be created. Some of them related to the structuring of joint-ventures were also in the process of development for the projects inside of the country; other types relating to how operate abroad were even newer and had to be learned from scratch

Eletrobras defined as its main targets abroad hydro generation and transmission systems, that should be pursued through a combination of acquisitions and greenfield projects, through partnerships with local players and other international power companies. Other renewables should also be considered, and cultural proximity was to be an important criterion in developing new opportunities. According to those principles, the company has focused initially on the American continents, mainly in Peru, Colombia, Chile, Uruguay and the US. Later some efforts were also directed to Mozambique, as the common language and cultural roots were considered helpful

From the start, the company was focused on a set of projects in Peru, under the coverage of a country-to-country treaty that was being elaborated. More specifically the hydro project of Inambari (2.200 MW), close to the Brazilian border, had its feasibility studied as another set of four large Peruvian hydro plants. Although long negotiations took place, neither of these projects was implemented.

The internationalization process has taught many lessons and many times the basic strategy had to be changed. For instance, initially, one of the goals was to develop new hydro plants in neighboring countries in order to import electricity to Brazil. But even the Brazilian

power planning authorities were not very interested in external sources of electricity, and in many countries with abundant energy sources the idea of exporting energy encountered internal political resistance. For this same reasons many Latin American integration projects, even with a clear economic logic behind them, will not have any chance of implementation in the next years. The principle of independence in order to guarantee the energy security is still an obstacle to block the electricity integration actions in the continent.

The focus on hydro projects corresponded to the use of the Eletrobras's advantages in building and operating this kind of plants, but difficult problems were found. In the case of Tumarin (253 MW), Nicaragua, it was very difficult to reach adequate power purchase agreements able to cover the costs and the insurances against political risks. In Peru, all the potential projects were to be built in the more isolated regions, as what happens with most of the potential hydro projects nowadays. In most cases environmental aspects made the projects infeasible. In the simplest case of Inambari, local protests fueled by smuggling and illegal mining, blocked its developments, even having the agreement of the Peruvian Energy Ministry.

The primary choice for developing greenfield projects corresponded with the company's and with the end of the privatization processes of the '80s and '90s in South America, the number of acquisition opportunities reduced significantly. However, evolving along the internationalization process Eletrobras understood that in order to move faster even small acquisitions could provide a quick entrance into a country, and help in the prospection and development of other opportunities.

As indicated above, possibly the most important international operation Eletrobras[35] has tried was the purchase of 21% of the EDP's shares, offered on sale by the Portuguese government. Previously, Eletrobras was discussing a strategic alliance with EDP buying only 5% of its shares a gaining a position in EDP's board; also, in negotiation was a possible purchase of two of the Horizon wind parks in US. When the 21% sale was proposed, all these movements were replaced by that larger possibility. The Eletrobras bid was however supplanted by China Three Gorges, and It blocked what could have been a step towards a future integration of both companies and the constitution of a luso-brazilian global electricity company.

This defeat against Chinese capital was not the only one suffered by Eletrobras, as it happened again in the African continent, as investments in a hydro plant and transmission lines in Mozambique being negotiated in partnership with the French company EDF were also thwarted by the Chinese, even as original agreements signed by the local government were ignored. The Chinese presence in Mozambique increased after huge reserves of natural gas in the north were found, and they offered huge credit lines to the Mozambique' authorities. Lately,

[35] Governmental support was expected for this operation, as part of the 'national champion' goals, and a large loan of BNDES, a federal bank, would be necessary.

a new partnership has being studied including, besides EDF, the Chinese company State Grid, and the South African SOE Eskon but it didn't go through.

Besides the difficulties faced by its projects abroad, Eletrobras suffered in 2012 from a new legislation[36] that, without freeing up the company of innumerous governmental obligations, eliminated the rents that company received through the tariffs paid for the energy generated by its old hydro plants, reducing radically its cash flow and its capacity of making new investments, what in practical terms suspended its internationalization process.

One last project was successfully implemented – a wind park in Uruguay, Artilleros, with 65 MW in partnership with the Uruguayan SOE, Administración Nacional de Usinas y Trasmisiones Eléctricas (UTE) and a new interconnection Brazil-Uruguay driven by UTE that required the construction of a new 500 kV transmission line integrating both countries.

5. Further Comments on the Internationalization

All internationalization processes here discussed reflected somehow the profound transformations suffered by the power sector in the final decades of the twentieth century. Even if the internationalization decisions had a mimetic component, as it was part of a broad process involving multinational companies in many other segments, a rational base for then clearly originated from the need to expand their horizons, to compensate the entrance of foreign competitors in their local electricity markets, in the face of changeable institutional conditions and new rules, requiring new competences.

The experience that Endesa/Enel, Iberdrola and EDP had to go through in the transformations of the European energy sector, seems to have become the main advantage that allowed them a successful entrance in the Latin American and Brazilian power sectors. Under pressures in their internal markets, they went abroad to countries with common roots and still in earlier stages of the sectorial transformations to buy new assets and find new investment opportunities.

Time seems to have been the crucial factor to generate the proper knowledge advantages. Even in the atypical case of Chile, where the transformation started very early and the local companies have moved abroad in South America to gain markets and add value, the Chileans were the first to arrive. Later, however, this factor was surpassed by the size and more stable financial conditions of its European rivals supplanting their time advantage; even if the latecomers had lost some of the gains implicit in the original privatizations. So, to the factor

[36] Introduced by the MP 579/2012.

time one should add the scale and large availability of capital sources to these crucial advantages in the privatization process.

A very detailed analysis of the motivations and advantages of the Spanish multinationals going abroad can be found in Toral (2008). His arguments about the Spanish companies could be easily extended to their neighbor EDP. Considering as reference Dunning's Ecletic Paradigm OLI and the additional Lundan expansions[37], the ownership, locational and internalization advantages can be found and made explicit to clarify their internationalization process. Toral, reviewing the academic literature that dealt with the Spanish MNE and using the Dunning OLI scheme, found out most authors pointed and discussed the ownership and locational advantages but not the internalization one, only analyzed by Lopez (1997).

The motivations in all three cases, as also in the case of Eletrobras, were similar: with the institutional transformations changing the power sector around the world, the entrance of new and often more powerful competitors in the local internal markets, not only reduced the possibilities of growth but put pressure over the incumbents to preserve their market shares. Moving abroad exploiting potential advantages, as many different companies were doing, seemed the best option to remain in business and to avoid being taken over by stronger players. Even if this view does not fit perfectly in the usual kind of internationalization of multinational companies, as it was not based on the exportation of electricity itself, or in moving parts of its production chain abroad

Investing in Latin America and particularly in Brazil was a choice made by our three companies as their board perceived its advantages. The choice of location conducted them to countries were the language, or at least the common roots (case of Brazil) with the Iberian Peninsula (L), tended to facilitate their operations. As indicated by Toral, the main ownership advantages (O) were related to the ability of the Spanish firms to deal with the technological advances and with their ability to raise the financial resources required. It was not very different for EDP in Brazil, with the same language and with its availability of funds, due to its interrelation with Iberian banks and its state-owned nature, in all three cases with their respective Iberian governments support.

In support of their advantages was the fact that the Latin American countries were undergoing similar transformations, usually with a delay in relation to the European processes, generating the crucial differences of knowledge on how to deal with the transformations and the competition, and how to change from a state-owned to a private company.

The internalization advantages (I) in all three cases that supported the purchase of assets and the opening of subsidiaries abroad, were related to the difficulties in transferring this

[37] Dunning (1998), Dunning and Lundan (2008), Lundan (2010); see also Cantwell (2015).

managerial knowledge[38] trough an intermediate goods market' mechanism, knowledge of an implicit nature, more in the head of the managers and in the culture of the corporations than in explicit rules. This tacit knowledge was much more adequately exploited through verticalization and the direct temporary transfer of managers, as it was done in all cases here examined, since the Chileans internationalizations to the posterior movements of Spanish and Italian companies.

Returning to Toral, he suggests in his analysis the adoption of a dynamic view to better understand these movements, considering that agents and institutions, firms and markets, co-constitute each other. The presence of the Iberian companies abroad is constrained by but also influences the local institutional conditions they face in their internalization. It should be added that according to Pitelis and Teece (2010), the co-creation of cross-border markets is one of the possible consequences of these processes, as the dynamic capabilities of the MNEs may help in creating new business environments in their new locations.

It is interesting to realize that Eletrobras motivations and internationalization logic was not much different from their Iberian counterparts, though without enjoying the time advantage. As its domestic market had been reduced in consequence of the increasing competition from foreign companies, including the Iberian ones, if the company remained solely domestic, it would have no more room to grow in the future.

In fact, in the case of Eletrobras, many reasons seem to be behind its internationalization decision, as well as behind its strategic choices along the process. As it was planning to work abroad always in partnerships with experienced partners, it would be easier to look for market-oriented returns and to attain the needed hurdle rates without the pressures made locally by interested groups.

Also, the possible gains in knowledge along the process, through the direct involvement of its human resources in "learning by doing", was explicitly considered as one of the main goals of internationalization. Developing new opportunities abroad and exposing the company to global competition was recognized as a source of new capabilities in itself. Making partnerships for the development of new technologies and participating in more sophisticated markets could allow access to new kinds of knowledge, not only technological, but also managerial, commercial and institutional. Working in different environments can be seen as a way to expose its human resources to other situations and to gain tacit knowledge through these new experiences; a situation that may have brought implicit gains also to Enel/Endesa, Iberdrola and EDP.

[38] Basically, tacit knowledge is only easily transferred in a person-to-person basis; it is interesting to point however that advances in the home-office practices and in the use of the web, as indicated by Panahi et all (2013), may mitigate these difficulties

Similarly, but not exactly as in the same case of the Iberian companies, Eletrobras' locational choices in Latin America, developing initial investments in Peru, Uruguay and Nicaragua, and lately in Africa – Mozambique -, were also conditioned by a reduced cultural and physical distance. In the case of Eletrobras they were also affected by the interest of the company' shareholders. Although it had made serious efforts to mitigate the risks involved in these locational choices, it has not been discouraged a priori by them[39]. This observation is consistent with the behavior of the Chinese SOEs facing risk investments, as found by Buckley et all (2010).

Looking at Eletrobras ownership advantages with the Lundam (2010) view, it can be said that the company tried to make use of its institutional ownership advantages (Oi, as Lundam); as a state-owned enterprise (SOE) it has access to a country-to-country non-market type of relationship. The possible umbrella of bi-lateral treaties, governing the project conditions, is more easily obtained by the participation of an SOE in the project. The Brazil-Peru energy treaty for instance was fundamental for the prospection of hydro plants in Peru and was intended to cover eventual electricity imports. Other more standard institutional ownership advantages are also present, related to previous experiences of operation in different regions inside Brazil that helped to better understand the non-market factors in target countries, and combined with language proximity, made easier building personal and institutional relationships.

The other ownership advantages, according to Lundan, assets ownership, Oa (property rights and/or intangible assets advantages), and transactional ownership, Ot, (advantages of common governance) may also be pointed in the Brazilian company case. One of its more important Oa advantages is knowledge associated with the development and operation of hydro plants and transmission lines at home, including complex social and environmental issues and their negotiation.

Use of this knowledge to generate value in the development of greenfield projects abroad is one important motivation for the internationalization of the company, and it can be also seen as a reason for its internalization (I advantage) to deal with an incomplete market in technology, as pointed out by Buckley and Casson (2010). An important part of this knowledge is tacit, depending on the experience of the people, and part is organizational, spread over different specialties. As such, it may be difficult to be transferred through the market with high transaction costs, becoming its internalization a better option.

Transactional ownership advantages (Ot) were in the case of Eletrobras existing only internally in Brazil, to articulate work abroad they were only in development. However, Ot have

[39] It was clearly the situation in Nicaragua, and, to some extent in Mozambique.

played an important part of the advantages for the three Iberian companies along their internationalization as they became efficient in buying assets or developing new greenfield projects directly by subsidiaries or through SPEs (special purpose vehicles created for specific projects) in partnership with other companies under company's control, what required a complex learning experience. Coordinating its internal groups, negotiating and drawing many kinds of agreements and contracts (confidentiality agreements, joint development agreements, memorandum of understanding, shareholders agreements, etc. are a few examples) are a common part of the constitution of partnerships and of the development of these projects. It includes the creation of a network of personal relationships with people from different companies and institutions. It took time, but it generates an important ownership advantage to support any company's internationalization actions.

Finally, the use of its Oi advantages was also clearly involved in the internationalization of the Iberian companies, as they have exploited intelligently their non-market and institutional relations inside their home countries to survive the liberalization and restructuring waves and have been protected and stimulated by their governments in its expansion abroad[40]. In their expansion they had to deal efficiently with the limits established by the regulators both at home and abroad. As pointed by Toral they were capable of managing the crucial financial sources and raise the resources needed that gave the effective support to their expansions.

Among their institutional characteristics, Endesa/Enel, EDP and Eletrobras, are or have been state-owned companies, with a close relationship with the governments in their home country. Only Iberdrola was constituted in the end of the past century already as a private company, but even so it had close contacts[41] with the Spanish government as the big utilities inevitably have to had, as responsible for a public service that is in part (transmission and distribution) a natural monopoly.

Both Endesa and Iberdrola were impeded at home to merge to foster competition but were somehow viewed as "national champions" and according to Toral, the Spanish government[42] through specific protections, financial incentives, subsidies for foreign investments and other methods, helped the internationalization of the Spanish MNEs. Not least, was the fact that Spain signed with most of the Latin American countries, agreements for the protection of their investments. This last position was so crucial that Eletrobras was decided to

[40] See Rozas-Balbotin (2009), (2008) and (2008b).
[41] For instance, Toral (2008) reports that the Spanish utilities '…worked closely with the Spanish government to solve the crisis that had affected the energy sector since late 1960s when the government forced public utilities to build nuclear power plants…' (p 531). Iberdrola was one of the companies who found itself later with heavy investments without adequate remuneration and needed government help.
[42] Toral (2011) discusses the role of the Spanish government promoting the MNEs in Spain; for instance, the cash handouts to Endesa and Iberdrola, before the opening of the Spanish market, helped them to raise capital to expand abroad.

open its international holding in Madrid, in order to have its Latin American investments covered by these agreements[43].

Eletrobras as an SOE had more clearly home institutional aspects governing its internationalization attempts. This fact presented some clearly recognized advantages, as country-to-country relations may be in many cases an important additional risk mitigation factor. But its complicated governance, with part of the decision process going even above the board itself, made its movements much slower and dependent of complex decisions influenced by different governmental representatives[44], not always exposing the same views about the internationalization.

6. Conclusions

The strategy of the international power companies was influenced by their home country energy context and planning: both conditioned their goals and capabilities.

The restructuring in the Iberian Peninsula was clearly marked by the abandonment of nuclear (in Spain) and the penetration of natural gas, with the introduction of the aeroderivative turbines, smaller and more efficient that the more conventional thermal generation. Iberdrola in particular has a strong position in the combined cycle gas turbines (CCGT) and in their latest versions that could follow more rapidly the variation of the load, an important feature to compensate the intermittency of wind and solar sources.

The development of gas plants is much faster than that of hydro or nuclear plants. As this new alternative was widely used, the physical transformations of the power sectors had its time lags reduced, facilitating the incorporation of new institutional designs. Nowadays, with a huge penetration of even smaller wind, and possibly solar, plants, changes may be implemented even faster accelerating the ongoing transformations of the sector. Quick supply answers to demand growth, may open new business opportunities.

As Enel/Endesa, Iberdrola and EDP had previous experience with hydro power and were under strong sustainability pressures, their internationalization, in what concerns the generation segment, was also marked initially by a choice of hydro or gas plants projects. Looking for a new kind of sustainable solutions and technological advances, making use of their favorable geographic conditions for wind and solar, they entered into the renewables wave and

[43] Brazil usually refuses to sign this specific type of agreements, requiring Congress approval, to avoid transfer judicial rights to International Courts; Petrobras had some protection when the Bolivian government tried to expropriate Petrobras' assets in Bolivia, because its holding was based in Netherlands. Netherlands and Spain were considered at the time by Eletrobras to host its international holding, being Spain its most likely choice.

[44] A more extensive discussion of the heterogeneity of the Eletrobras board while the internationalization was pursued can be viewed In Pimentel and Fellepa (2012).

increased, at home and abroad, their involvement with wind parks[45]. The close relationship of Endesa and Iberdrola with the wind turbine maker Acciona, may have also weighted in their options[46].

In their international growth with these new clean sources, only Enel seems to be really focused on the development of centralized solar units in Brazil, as EDP and Iberdrola have been relatively slower. The competition in solar also grew, and many new smaller players have multiplied and may be more effective in a more pulverized expansion. Solar panels and equipment are now dominated by big Chinese suppliers, supplanting early European industrial producers. It is not clear yet whether the big Chinese utilities will also be more active in this segment. The possibility of effective solar technology transfer could be the key for a bigger penetration by foreign companies, both in the centralized and distributed markets.

As Brazil needs to push forward its technological development, and has a large potential market, a type of Atlantic partnership could be successfully promoted if the players' strategic orientations start moving in this direction and if the right institutional conditions are established.

The recession that slowed demand growth in Brazil, and somewhat in most of Latin America, slowed also the development of local solar equipment industries, that a few Chinese MNE were planning to implement, following the example of the big international wind industries[47] already with many manufacturing units in Brazil. As soon as the economic scenario returns to a better situation, and the demand for electricity returns to its 3-5% expected growth, new generating plants will be required. It is possible that natural gas from the pre-salt will force an increase of thermal generation, but it should be limited by climate considerations, and wind and solar new plants should keep growing.

The internationalization of utilities here examined clearly indicated that time can be a crucial success factor.

Looking for new business opportunities in the Brazilian power sector one can expect a steady growth of new renewables, requiring more system integration and coordination. The ongoing introduction of effective local and hourly costs will expose more clearly the system costs not considered in the levelized costs of individual plants. New technologies and new commercialization rules will be needed, what may open interesting opportunities, both in Brazil and Latin America, to companies that have already faced this situation in their home markets. The same can be said, looking a few years ahead, about the integration of coupled markets and/or more intense commercialization across the Latin American countries' borders. In this

[45] At the end of 2019 in Brazil, EDP R had about 467 MW wind plants installed, Iberdrola (Neoenergia) 516 MW, and Enel/Endesa 842 MW; Enel/Endesa had also 819 MW of solar PV installed.
[46] Not very differently, maybe, of the historical relationships between Eletrobras and the Brazilian construction companies.
[47] See FGV IIU (2016).

case the property of CIEN by Enel/Endesa, may be an important starting point. The same is true for Eletrobras international interconnections, with emphasis to the one with Uruguay.

Observation of the continuous growth of the participation of Iberian/European utilities in the local Brazilian and/or Latin American electricity markets suggests a few policy recommendations that must be highlighted for their common involvement in the Brazilian case.

First, the expansion of a sustainable power sector requires more than ever the development of new technological solutions. Considering the co-creation dimension of successful internationalization projects, the size of the Brazilian market and the technological development of Spain/Portugal, a stronger Atlantic partnership should be promoted, implementing common research centers in Brazil and reinforcing the local industrial base, related to solar energy. Mixed solutions involving the integration of new renewables, natural gas and storage solutions may also be usefully jointly exploited.

New institutional and technological advances are coming to the Brazilian power sector. Developing and applying new methods and tools will be crucial to put them to good use. An integrated research effort anticipating these changes may constitute a solid base to visualize, influence and seize the opportunities that will arise. It requires from the Iberian companies more than just buying assets and needs the creation of new solutions under a collaborative design.

Second, the international presence of local companies serves other national interests, facilitating business for other companies abroad, reinforcing commercial and cultural relationships. Experience shows that in all the cases examined the national governments played an important role to articulate the corporate solutions. The challenges of cleaning the energy matrix, may need regulatory and governmental help and incentives.

In a very competitive context and the need to maintain a clean electric matrix, while electricity demand may growth a 3-5% a year, it is not obvious that the Brazilian State can relinquish the control of its SOE. The privatization of Eletrobras, the remaining Brazilian large electricity company, if advanced, should be made in such a way to preserve the existence of an important local company in the power sector, and keep a longer involvement of the State in its governance in order to protect its role as a national player and to promote the continuous evolution of a sustainable power sector.

The example of the EDP privatization, and the long involvement of the Portuguese government in the EDP governance, may be one to be exploited. A renewed and restructured Eletrobras has to be stimulated again to operate abroad, helping to accelerate the South American electric integration, and developing new knowledge and capabilities through the exchanges of experience. Strategic partnerships of Eletrobras and the Iberian/European

companies are still open to be built. More than economic alliances, the point here is the creative development in the power sector, of an Atlantic view.

Third, if the Iberian/European utilities want to keep their time advantages in the Latin America power sector transformations, they should assume a clear position in favor of the sustainable solutions, as it seems to be a local and global growing concern. They should keep transferring to local subsidiaries through the Atlantic their advances in solar, energy storage and commercialization, in anticipation of predicted futures changes. Supplying an increased international market can help these companies to reach further advances towards a cleaner energy matrix, promoting the global expansion of renewables and the replacement of fossil fuels, in tune with the needs and wishes of the society as a whole.

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