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# How To Make A European Integrated Market in Small and Isolated Electricity Systems? The Case of Canary Islands

By Yannick Perez

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# The Case of Canary Islands

**Yannick Perez**

*Maître de Conférences.*

*Université de Paris-Sud 11*

*Groupe Réseaux Jean-Monnet - ADIS*

27 avenue Lombart Bureau C 309

92260 Fontenay aux Roses Cedex. FRANCE

Email : yannick.perez@u-psud.fr

**Francisco Javier Ramos Real**

Departamento de Análisis Económico e Instituto de Desarrollo Regional

Camino de La Hornera s/n. Campus de Guajara

Universidad de La Laguna

38071 La Laguna. SC de Tenerife

Tfno: 922 317110. Email: frramos@ull.es

**Abstract:**

In this paper we want to highlight the geographic dimension not often studied in the dynamic of creating a European Union internal market for electricity. This Dimension is the case of small European electricity systems like Greek's French's and Spanish's islands or Cyprus, and Crete. Our question is then: How to achieve a good "looking-like" internal market for electricity in small & isolated systems? This question is very important because for these regions, having clear and common rules for electricity furniture is a major concern to foster their economic attractiveness towards EU industries. In order to do so, we identify the main problems to be overcome by introducing a methodology in which the Canary Islands experience is taken as a case study for understanding the challenges to create an "EU look-like market for electricity". Our results are that the design of the vertical industrial structure and the figure of the network operator and his attributions are a fundamental point for the correct functioning of any electrical system. We also stressed the role of other possible options to produce this EU compatibility market by distinguishing first in the wholesale market: the call for tender's solution to introduce more generation, the Bilateral contracting option and the risk of using safety requirements as barriers to entry in theses small markets, and second in the supply activities the possible problem of bad regulated tariff scheme which are not adapted to the creation of an EU internal market for electricity in isolated systems.

***Keywords**: European Single market, competition, isolated electricity systems, the Canary Islands.*

## 1. - Introduction

In the last three decades deep transformations have taken place in the organisation and regulation of the electricity industry in the world. Since the early eighties, an increasing number of articles in the economic literature are advocating vertical disintegration and the replacement of common property across generation-transmission and distribution networks-and supply, *"introducing competition where possible"* (Littelchild 1983 & 2006). The idea is that the competitive system would replace, through price coordination, the command and control type of coordination. Competition among an increasing number of firms would permit cost and price reductions at generation and supply levels. This in turn has to foster economic performance of the companies using this cheap electricity in their production process.

The restructuring of electricity markets in most Continental European (CE) countries started in the late 1990s, and is still going on. This process was triggered by the European Commission directive, 1996(EC), *"Directive for a common electricity market"*. The major motivation for this directive was the EC's conviction that liberalization, price deregulation and privatization would directly lead to competition in generating, as well as supply which would then result in lower prices for the whole of Europe and increase its price competitiveness. The EC's main expectation in the directive was the belief that *"market forces [would] produce a better allocation of resources and greater effectiveness in the supply of services"*. In June 1996, after more than 8 years of discussion, the European Council of Energy Ministers reached an agreement with the European Parliament on a market liberalization directive, and six months later passed the full Directive Concerning Common Rules for the Internal Market in Electricity which, with the intention of restructuring the European power industry, became law in February 1999. The major issues of this Directive (officially named 96/92) were: Minimal requirements for the *unbundling* of generation and transmission; Minimal *Market opening*, expressed by the consumption size of "eligible customers"; Different approaches for the *access to the grid* (negotiated or regulated, Third Party Access or Single Buyer. See annex 2 for the review of situation in EU).

However each national government within the EU had to “transpose” the EU Directive into national law and national rules (an overview on the major milestones & market structures choices are provided in annexes.) In practice, the major area of action within the European liberalization project was “providing access to the market”. In addition, Environmental issues were also treated very prominently (see Finon & Perez 2007 paper for an comparative analyze of the devices used to promote Renewable Energy Sources for Electricity).

On the contrary, aside from a minimal unbundling, the restructuring of utilities and the design of market places was not tackled comprehensively by governments in most countries in some major dimensions like: market power of incumbent companies (Glachant and Lévèque 2007, Willems 2007, Barquin & ali 2006); investment incentives in the long run based on short term market mechanism (Joskow 2006; Crampton and Stoft 2006, Oren 2006) and in our point of view, the more important, the geographical issues witch constrained the EU single market creation.

We argue that geography matters in at least two dimensions in the achievement of EU internal market for Electricity: First, within the Continental Europe, the initial intention of the EC was the creation of a common European electricity market, but, this area still consists of at least seven large different sub-markets which are separated by insufficient transmission capacities, and differences in conditions for access to the grid. This concern is now quite clearly understood by EU commission and Scholars as the work done by Haas & alii, (2007), Green & ali (2006) have shown (see Fig. 1.1).

**Figure 1. Electricity sub-markets in Europe in 2007**

In contrary, the second dimension we want to analyze in this paper is not tackle yet in the literature at best at our knowledge. This second dimension is the case of small European electricity systems like Greek’s islands, French’s islands, Cyprus, Crete and finally Spanish’s islands. How to achieve a good “looking-like” internal market for electricity in small & isolated systems? This question is very important because for these regions, having clear and common rules for electricity furniture is a major concern to foster their economic attractiveness towards EU industries.

For answering this question, we will focus on the Spanish island and extra-peninsular electricity systems (SEIE)[i], and we will try to underline what improvements can be done according to the "creating markets in electricity" literature to help them to achieve an EU look-like market for electricity.

By doing so, we also identify the main problems to overcome in this Isolated systems. Our methodology will be to use the Canary Islands experience as example (or benchmark) for other isolated electricity systems facing a process of adapting structure and regulatory reforms to create an "EU look-like market for electricity".

To attain our objective, we have to analyse a series of preliminary issues, for which we propose the following structure. Section two briefly analyses the theoretical proposals for the vertical disintegration of the industry and the different modes for creation of electricity market by introduction of competitive mechanisms. Section three deals with the special characteristics of isolated electricity systems and the regulations specifically for SEIE. The next section describes the evolution and the regulation and operating model of the Canary Island electricity sector. Section five discusses the final integration model resulting from these modifications and the effects and consequences of the new regulations on the possibility of introducing competition in the Canary Island electricity market as a possible way for the other isolated systems. Finally, we present the leading conclusions and lessons for the other isolated systems we have drawn by this study.

## 2. – The disintegration proposals and the creation of market for Electricity

### 2.1. – The disintegration proposals

As Joskow and Schmalensee (1983), Joslow (2000), Stoft (2002), Glachant and Finon (2003) all point out, the economic debate for disintegration should answer the following question: can a new organization of electricity activities generate transaction costs in the midterm that exceed the benefits arising from disintegration and the introduction of competition? Four levels of disintegration can be defined, based on the traditional model. These will, in turn, define different kinds of reforms to the electricity

sector. These alternatives are: a separation between generation and the management of the transport infrastructure, separation between this and the management of generating capacity (energy dispatch)[ii], a separation between transport and distribution and, finally, a separation between distribution and Supplier.

1. - Disintegration of generation and transport involves a separation between a natural monopoly activity and another activity that could be competitive. Moreover, transport, as an activity, also involves operating the system and dispatching the energy. Therefore, we can discuss two levels of disintegration.

Separating network management and generation is justified by the discriminatory practises that could be adopted by whosoever administers the transport infrastructure if they have to provide grid access to third parties (who are generating competitors). This double function provokes a risk of introducing entry barriers, crossed subsidies and other kinds of opportunist behaviour, especially if the network operator also dispatches the energy. Concerning the separation between managing the transport network and energy dispatch, there is a relative consensus in considering the separation of these activities preferable if the dispatcher is also the owner of the generating assets.

2. - The separation between transport and distribution represents a choice between two forms of organising two natural monopolies. However, it does not appear to be an issue that affects the capacity to establish competition in the market. The key factor is to determine if a joint operation of the transport and distribution networks (the operation of the medium and low tension networks) will generate enough complementarities to justify the integration. This question has not been solved either theoretically or empirically, which explains the co-existence of different models in the different reforms applied to European electricity systems.

3. - Disintegrating distribution and supply or marketing to the client, involves introducing competition in the retail exchanges between electricity consumers and suppliers[iii]. Although distribution is a natural monopoly, Supplier can be considered as a situation in which the end users choose their supplier according to certain commercial offers and based on supply quality.

*2.2. – Introducing competition in the electricity sector*

With the support of Stoft (2002), Wilson (2002), Hunt (2002) and Staropoli (2001) however, we can classify the different models of reform that can be identified to introduce competition (see also table 1 for a European empirical survey on this issues). A first model is based on the creation of a single buyer who centralises the short term production supplies of the different competitors. This model is based on a competition procedure, whereby the purchaser makes his choice on the basis of criteria of transparency and not discrimination. Any customer gaining access to the market (qualified) can require the single buyer to acquire and transport the electricity that said purchaser has bought from a certain supplier. Unqualified customers, on the other hand, will buy their electricity directly from the single buyer.

The second model consists of allowing the different producers and qualified customers to establish bilateral short, medium or long term contracts while the grid merely transports the energy. Contracts are negotiated on the basis of common agreement (Over the Counter - OTC) and access to the network has to be opened up (Third Party Network Access – ATR, from its initials in Spanish) with controlled or negotiated tariffs, and free access to the production market to guarantee market answerability.

The third solution is to create a wholesale spot market in which electricity supply and demand will meet in accordance with pre-defined rules that are applied to all participants with the same yardstick. On the supply side, the participants are generators; and the distributors, Supplier companies and qualified customers connected to the transport and distribution network are the participants on the demand side. Running in parallel to the spot markets, financial instrument markets can also be created to ensure price volatility, or the possibility of negotiating direct bilateral contracts between producers and consumers for different time lines. These markets may coexist with the old industrial structures or the organised wholesale markets.

**Table 1 : Differences in reforming and market design in various countries**

## 3.- Isolated electricity systems and the regulation of Spanish island and extra-peninsular Electricity Systems (SEIE)

### 3.1.- Characteristics of isolated electricity systems

Small sized electricity systems, which are not connected to other systems, present a series of characteristics that complicate and raise the costs of electricity supply. The generation units cannot be too big as the loss of one generator would represent a large effect on the overall system. This means that economies of scale cannot be adequately exploited on the same level as the large electricity systems and it makes the technical management of the network more complicated with regard to the frequency and tension. Isolation also makes it necessary to maintain more reserve capacity to ensure adequate supply and, therefore, they cannot take advantage of the possibilities inherent in interconnected electricity system, which generate greater stability in a system.

More specifically, Weisser (2004 a, 2004b) examines the main problems faced by electricity systems in small, isolated island systems, the main one of which is that electricity supply in these territories is also more expensive because there are high fuel transmission costs. These constraints require different planning and treatment from those of mainland territories. In the case of being state owned, these territories usually pay the same tariff, so (due to the higher supply costs) they must be subsidised by society as a whole (as is the case of Spain). Clearly, regulation thus plays a highly important inter-territorial redistribution role[iv].

In these circumstances, the introduction and development of renewable energies could be an interesting alternative to conventional models based on fossil fuels, from a social and economic point of view. This presents a solid instrument for meeting the main objectives of energy policy: economic efficiency, environmental friendliness and security and diversification of supply. However, its interruptible and irregular nature, together with isolation, will have an important impact on the rate of penetration of these electricity systems. As we analysed in section 2.2, there are several ways of introducing

competition. The most obvious way is by connecting with other, larger systems. However, when this is not possible, there are other feasible alternatives if the electricity systems are of an intermediate size. Kozloff (1998), in reference to small systems in which the improvements arising from competition are limited, proposes the single buyer model as an intermediate solution between competition and regulation. This model has the added advantage of being able to explicitly consider the development of renewable energies. Finally, in some isolated systems (like in Patagonia), consideration has been given to the introduction of physical, bilateral agreements between producers and qualified customers, which complement a traditional model regulated with agreements between the parties.

### 3.2. – Operation and economic regimen of SEIEs

In fact, Spain[v] introduces with the Electricity Sector Act (LSE, from its initials in Spanish), Law 54/1997, to move from a regimen of traditional regulation towards one that introduced competition in the generation and supply activities. Article 12.1 of the LSE, however, proposed special regulations for island and extra-peninsular systems (SEIE), in which the system designed for the market to operate in the mainland electricity system would not be directly applicable due to the geographic specificities arising from the size and isolation of SEIE.

In this section, we will explain the main operation of SEIEs based on the new model established by Decree 1747/2003. We will highlight the main differences in comparison with the mainland electricity industry.

The LSE is based on the existence of a wholesale electricity market for suppliers and demanders of energy to jointly determine the price of acquiring energy in the pool. The management of the economic relations between the stakeholders and the technical management of the system are conducted by two independent operators, such as OMEL (Electricity Market Operator, from its initials in Spanish) and REE (Spanish Electricity Grid, from its initials in Spanish) respectively. To calculate the regulated electricity tariff, the regulated transmission tariff is charged on top of the wholesale market price, and for small customersvi, the distribution tariff (access tariff) is also added. Supplier

companies will gain a margin from their customers. A series of surcharges and taxes are also added, which have to be paid by all consumersvii.

In the case of the SEIEs, the intention was to consider their peculiarities on the premise that regulation will stay as close as possible to the general principles of the LSE. In this sense, the activities of transmission, distribution and supply follow the general criteria applied on the mainland with regard to the rules of operation and retribution of regulated activities. In the same way, market operators and the grid will have practically the same faculties as in the mainland system, although they are subject to the special technical operating particularities established in the legislation for SEIEs.

Having mentioned the common elements, we will now describe the main particularities established in the legislation for SEIEs for regulating the operation of the electricity industry. These are as follows:

1.- Planning of regulated activities encompasses not only transmission, but generation too, which must be done in a co-ordinated manner with the Regional Government. This planning encompasses at least, estimating the necessary power that must be installed to cover forecast demand under the application of supply security criteria[viii].

2.- Calls for tenders for new capacity can only be convened by the Regional Government if the minimum level of reserve power is not reached.

3.- A generation dispatch is established by declared variable costs, which works on an order of merit. In the dispatch, managed by the network operator, the installations participate on the basis of an ordinary regimen, and they can also do so under a special regimen to cover the demand of distributors and suppliers[ix].

4.- The activity of generation is external to the mainland supply market and its retribution contemplates an additional element to compensate the specific costs that are included as a surcharge on the general, nationwide tariff. The cost of each generator in ordinary regimen (Cg) represented by the retribution for generators, for each group (i)

by the hour (h), is established from the average mainland price, using the following expression :

$$\mathbf{Cg\ (i,h) = e(i,h)*[PMP+PrF(i,h)]+Gpot(i,h)*Pdisp(i,h)} \qquad \mathbf{(1)}$$

The first sum of the formula is intended to cover the variable costs, where e(i,h) is the energy generated in kWh. PMP is the average annual price approved for determining the electricity tariff in the mainland system in euros/kWh, which includes the charges for providing complementary services. PrF (i,h) is the operating premium in euros/kWh that complements the PMP as retribution for fuel costs.

The second sum of the formula represents what is known as the power guarantee that is established to remunerate the costs of investment, operation and maintenance. It is calculated by multiplying the unit value Gpot (i,h) by the available power of each generator (Pdisp). It must give consideration to the reserve level necessary to maintain the electricity system and it is calculated by the availability really provided to the system[x].

The premium (PrF) and the retribution for power guarantee (Gpot) are established by the Ministry of the Economy based on a report by the National Energy Commission and classified by technologies. This bears in mind the cost of the fuel used, interest rates that represent the cost of the resources and the costs of operation and maintenance.

5.- The energy generated by the facilities in ordinary and special regimen can be bought by distributors to supply consumers subject to tariff, by suppliers to supply their customers and by consumers who decide to go directly to the market. The purchase price will be the final average hourly price for stakeholders of this kind in the mainland system as a whole. However, each SEIE can adapt this hourly price to the local seasonal structure of the demand in order to put out the right economic signals to consumers.

In short, points 4 and 5 delimit a system whereby consumers pay a price or tariff, in some cases, that is equal to the price for the mainland Spanish system, while generators receive remuneration in which the higher generation costs are compensated. This

compensation is financed from a surcharge on the price and the tariff for the entire national system.

## 4.- The electricity sector in the Canary Islands: evolution and regulatory framework

In this section, we describe the particularities of the electricity sector in the Canary Islands. The regulations have experienced major change since December 2003, with the application of the reforms arising from the liberalisation process that has affected the previous Spanish electricity system. In addition, based on the following table, we think that Canary Islands are a good benchmark for understanding the option and problems of creation of market for electricity. The 3 main Canary Island are almost comparable with EU main isolated systems in terms of installed capacity, demand profile, security margin in operation and size and levels of voltage grids.

**Table 2: basic structures of some EU small electricity systems.**

We start by describing the main magnitudes of the Canary Island electricity sector, before studying the legislation and the institutional setting in which the sector operates.

### 4.1.- Trends of the main magnitudes

The Canary Island electricity system presents the characteristics of a isolated system, that is, disconnected from the major European electricity networks. Moreover, the isolation of the system is twofold, as each island, in turn, forms an independent electricity grid, with the exception of the connection between Fuerteventura and Lanzarote[xi]. Table 3 presents electricity generation in the seven islands, which gives us an idea of the size and importance of each of the island electricity sub-systems and of the enormous growth experienced. Between 2000 and 2004, the average annual growth was 6.2%.

**TABLE 3. GENERATION PER ISLANDS GIGAWAT-HOUR**

Table 4 shows the cover of the demand, broken down by generating technologies and by kinds of primary energy between 1985 and 2004. Most of this is covered by thermal

power stations (diesel and co-generation), accounting for approximately 96.2% in 2004. Only 3.2% of this percentage comes from self-producers. Concerning renewable energies, these have grown substantially, representing 3.8% in 2004, basically due to the contribution of wind energy.

TABLE 4. **FUEL MIX IN GIGAWATT-HOUR**

As we saw, island systems have certain singularities arising from their distance from the mainland and their isolation, which give rise to high supply costs. In the case of the Canary Islands, the fragmentation of the overall system into small sub-systems means that practically only oil derivative fired power stations have been used as a source of primary energy, which also acts as a constraint on the technologies used and the size of the generating units. The data indicates that the average size of the generation units, based on coal-fired units in Spain, is more than twice the size of the largest power station in the Canary Islands[xii].

Another factor that must be taken into account is the peculiar geographic characteristics of the islands, which also increases the transmission and distribution costs[xiii].

The industrial model of the Canary Island electricity sector has worked to date, with a single vertically integrated company (Endesa-Unelco) in the stages of energy generation, transmission-dispatch and distribution that is responsible for guaranteeing supply under conditions of adequate quality and security[xiv]. The Canary Island electrification process has taken place over the last twenty five years of the 20th century[xv]. In this sense, the intervention of the National Institute of Industry (INI, from its initials in Spanish) from 1965 was a determining factor, as it started a process of mergers and take-overs that continued throughout the 1970s. In the eighties, Unelco could, in practise, be considered the only company in the Canary Islands producing and distributing electricity.

*1.2. 4.2.- The current regulatory framework of the Canary Island electricity sector*

The Canary Island electricity sector is regulated by a series of different national and regional laws and regulations. Nowadays, the regulation of the sector in the Canary

Islands is founded on the 1997 Electricity Sector Act (LSE), and specifically on Royal Decree 1747/2003 for the SEIEs described in section 3.2. It was not however, until the ministerial orders of the 31st of March 2006 were published (which came into effect on the 10th of April), that the legislation applicable in the Canary Islands was really defined. These orders developed the decree, explicitly determining the power required for the security of the system and the compensations for operators[xvi].

On the other hand, the Canary Island Electricity Sector Regulation Act, law 11/1997, develops that attributes established by the Canary Island Statute of Autonomy in energy and electricity sector planning. As a result of this regional legislation, Decree 50/2003 (30th of April 2003) appointed the REE as the system operator and as the manager of the high tension transmission network. But, as Royal Decree 1747/2003 did not lead to the corresponding ministerial orders, there was a delay in the application of these measures. Hence, although REE (Electricity Network) has been acting as manager of the Canary Island Autonomous Region transmission network and operator of the electricity system, it has only been able to exercise these functions in practise in a manner that was not binding on the stakeholders until April 2006.

Finally, the general legislation on energy in the Canary Islands, the terms and conditions of which are presented in the Canary Island Energy Plan (PECAN 2006), is highly important. The PECAN 2006 does establish the objectives that serve as inspiration for energy policy, with the emphasis on diversifying sources of supply and energy saving through efficient energy use..

## 5.- The new structure and the road to an "EU look-like" market for Electricity

### 5.1.- New vertical integration structure resulting from the reforms

The changes in regulations arising from the implementation of the legislative changes made in the Canary Island electricity sector described in sections 3 and 4 represent a new vertical integration structure as can be seen in graph 1. Up until March 2006, Unelco-Endesa was a vertically integrated company that managed the system, generated most of the electricity and had exclusive control over the transmission,

distribution and supply of the electricity. Two significant changes have taken place in the new arrangement.

The first of these is the appearance of REE as the manager of the transmission network and system operator. REE is not the owner of the transmission network but, as the system operator, it is responsible for ensuring access to the grid for all stakeholders in conditions of transparency and equality. In this sense, REE acts as a single buyer that buys energy using a generation allotment method (based on minimising the variable costs of the generator units) and delivering it to the distribution network for its later sale, or directly to qualified customers.

Furthermore, as the network manager, REE is responsible for long term transmission network planning, proposing the resources and the means to achieve the supply guarantee level for each island electricity system. As the party responsible for security, REE studies and authorises or rejects the works proposed by the installation owners that need to be carried out on the transmission network and they issue the necessary orders for exploiting the network.

This structure, in which ownership and management are not integrated in a single body, can generate major problems of co-ordination and/or incentives, and it does not permit an efficient use of capacity and, therefore, operation of the electricity system. As we saw, if the transporter is also one of the generators, he can act in such a manner as to place constraints on the entry of other competitors, even though REE is the network manager. In the case of the Canary Islands, this is a problem could occur as Unelco-Endesa is the sole transporter and it is practically the sole generator for the different island systems.

The second modification concerns the appearance of the figure of the supplier who buys energy from the network operator at the same price as for the mainland system. Although they could, in fact, operate as such since 2003, the presence of REE in the Canary Islands may facilitate the entry of new suppliers and increase the specific weight of this activity in the market, because it allows for greater transparency in the operations of the system[xvii]. This element could promote free competition and improve

the economic efficiency of the electricity system, although it is insufficient, as there are certain deficits that could affect the operation of the retail market, which are analysed below.

**Figure 2: From the old to the new model.**

### 5.2.- Do more market possibilities exist?

In this section, we offer some thoughts on the effects of the new operating system on the possibility of creating competition in the Canary Island electricity sector. The advantages of introducing competition could translate into increments in the productivity of the electricity system. Ramos-Real (2005) analyse a range of empirical studies in which major gains in the global productivity of the factors have been observed, which have led to reductions in costs that have not always been passed on to the final prices and tariffs for customers however. Perez (2002) finds large increases in productivity per employee since the liberalisation processes in many European countries.

We would like to emphasise the fact that, in our opinion, the fundamental objective of decree 1747/2003 is to bring electricity prices in the Canary Island in line with those of the mainland market and for consumers to benefit from these. For this reason, the introduction of competition in SEIEs is contemplated in a marginal manner in the decree. However, several interesting issued can be highlighted on this subject.

From our point of view, we believe that the regulation of and retribution for the regulated activities is fine, that is, transmission and distribution and the figure of the independent operator. However, there are some disadvantages generated by introducing competition in both the generation and the supply segments.

In line with the preliminary CNE report (2003) on regulating SEIEs, we believe that the modifications made in the regulations for generation, with regard to introducing competition into the market, are insufficient. Our conclusion is based on the following facts.

1. - The Regional Authorities can only promote calls for procurement tenders if they do not reach the minimum level of reserve power. This possibility per se, does not seem enough to create competition and we feel that it would be advisable to complement it with some other measures. For example, there is the possibility of establishing a limit for the current producer, or positive discrimination in favour of new companies to the market. Moreover, the definition of necessary power, is made in terms of a monthly value of the probability of loss of charge, established a value that is equal to the mainland system. As the White Book for the Regulatory Reform of the Electricity Generation in Spain (2005) indicates, makes the availability of a high rolling reserve capacity, which entails excessive costs, compulsory. This safety requirements needed could induce a way to introduce barrier to entry in the Canary Islands.

2.- There are an additional barrier to entry arising from article 9.2 of the Canary Island Electricity Sector Act, which obliges new generating companies to present tenders for more than one island, one of which cannot be Tenerife or Gran Canaria. This way, any company wishing to enter the market will have to set up on a small sized island, which could involve greater complications for a potential new-comer to the market.

3.- The LSE excludes island production from the mainland supply market. They could have introduced other competitive mechanisms, like the possibility of establishing bilateral contracts between producers and Supplier companies or qualified customers, as we indicated in section 3.1 for isolated systems. This kind of contract could also be established in the medium and long term, which would foster the entry of new stakeholders on both sides of the market, and could help to develop the marketing of green energy. As the CNE indicates (2003), to do this, the average system compensation would have to be granted to the producer involved, based on equation (1) as otherwise, the consumer would only have incentives for contracting the service with Supplier companies, as, with them, they would pay the same prices as on the mainland[xviii].

With regard to supply activities, there are some fundamental problems that have to be solved, which also occur in the rest of the country, but which are more serious in the Canary Islands due to the greater difficulty in developing a truly competitive model in

comparison with the mainland model. The first problem is the competition represented by an regulated tariff by default (if it is very low) that could act as a refuge for consumers and a constraint on an adequate development of the sales and Supplier activity, as Sanchez-Macias and Calero (2003) observed in the Spanish market in 2001 and 2002. The elimination of this default tariff does not seem to pose major problems for large consumers, but this is not the case for domestic consumers.

In any event, while the default tariff remains, an attempt must be made to avoid opportunist behaviour that acts as a constraint on free competition in sales and Supplier. This behaviour includes a change by consumers from regulated tariff to a market tariff or vice versa, depending on the time of year. Another, maybe more serious problem is the competitive edge that the existing distributor-Supplier companies has over all other Supplier companies, which generates market power and makes it more difficult for new companies to enter the market. In an attempt to mitigate this effect, there should at least be a correct separation between the activities of distribution and sales and marketing.

## 6.- Conclusions and main lessons for EU Isolated Electricity systems.

The introduction of competition in small isolated systems bears a series of difficulties that have been indicated in previous sections. Nevertheless, in the stages of generation and supply of electricity his partial introduction is possible[xix] whenever a suitable model of regulation is designed correctly. The most obvious way is by connecting with other, larger systems. However, when this is not possible, there are other feasible alternatives if the electricity systems are of an intermediate size.

The Canary Islands experience could be interesting as example for other isolated electricity systems facing a process of structure and regulatory reforms to introduce competition. As general learning we can emphasize that the design of the vertical industrial structure and the figure of the network operator and his attributions are a fundamental point for the correct functioning of any electrical system. Nevertheless, in the isolated systems the latter aspect is even more relevant because the biggest number of tasks that the operator assumes.

We can emphasize the following lessons for the generation wholesale market:

- The creation of this type of markets is incompatible when there is a monopoly in generation. To create a wholesale market it is necessary to apply some type of forceful measurement. For example, the possibility of establishing a limit for the current producer, or positive discrimination in favour of new companies to the market, when Regional Authorities promote calls for tenders to reach the minimum level of reserve power.

- There exist other competitive mechanisms, like the possibility of establishing bilateral contracts between producers and Supplier companies or qualified consumers.

- The regulatory bodies must try that the safety requirements needed do not

generate so high cost that is constituted a “barrier of entry” for new actors on the market.

There are also some elements lead to a weakness in the operation and working of the retail electricity market like:

- The competitive edge that the existing distributor-supplier companies has over all other companies.

- The competition represented by a regulated tariff by default (if it is below the competitive price) that could act as a refuge for consumers and a constraint on an adequate development of the sales and Supplier activity.

We think that the general lessons we have underline here could help them to go a step further in the creation of an “EU look-like” market for electricity.

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**Table 1 : Differences in reforming and market design in various countries**

| | Process of market opening | Mandatory pool | Voluntary Day Ahead Exchange | Futures market | Privatisation process | Divestment of generation capacity | Takeover, Merger within the country |
|---|---|---|---|---|---|---|---|
| AT | Fast (2 years) | No | YES (EXAA) | YES (EEX) | Moderate | No | Under discussion |
| BE | Slow | No | No | No | *) | No | No |
| CZ | Moderate | No | Yes (2004) | No | No | No | No |
| DE | Very fast | No | YES | Yes | *) | No | YES, half electricity generation plus Ruhrgas |
| FR | Slow | No | Yes | No | No | No | YES, 2 fringe generators |
| HU | Moderate | No | No | No | Moderate | No | No |
| IT | Slow | No | Yes (since 2004) | No | Yes | Yes | YES, mainly abroad (ENEL in SK) |
| LU | Slow | No | No | No | N.A. | No | No |
| NL | Moderate | No | Yes (APX) | No | Yes | No | YES, mainly from abroad |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PL | Fast | No | Yes | No | Moderate | Yes | Moderate |
| PO | Moderate | | No, but intended with Spain | No | No | Yes, moderate | Moderate abroad |
| SK | Moderate | No | No | No | Yes | No | No |
| SL | Moderate | No | Yes (2003) | No | Moderate | Moderate | No |
| ES | Moderate | Yes | No | No | *) | No | No |
| CH | No | No | No | Yes (EEX) | *) | No | No |

*) Major generators were already largely private before liberalization started

Source Haas & ali (2007).

| **Table 2: basic structures of some EU small electricity systems.** | | | | | |
|---|---|---|---|---|---|
| | **Installed capacity in MW** | **Pick of demand in MW** | **Security margin in %** | **Transmission grid** | **Distribution grid in kv** |
| Guadeloupe | 358 | 218 | 61 | 63 kv 385 km | 20 |
| Cyprus | 990,2 | 775 | 78 | 66kv 324 km<br>132 kv 711 km | 11 |
| Crete | 703,9 | 471 | 67 | 66kv 15,5 km<br>150 kv 501,3 km | 20 and 15 |
| Lanzarote-Fuerteventura | 345,89 | 212 | 61 | 220kv 162 km<br>66kv 905 km | 20 |
| Gran Canaria | 860 | 552 | 64 | | 20 |
| Tenerife | 774,5 | 540 | 70 | | 20 |
| *Source :Local companies and own construction* | | | | | |

| TABLE 3. GENERATION PER ISLANDS GIGAWAT-HOUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Year** | **Tenerife** | **La Palma** | **Gomera** | **Hierro** | **G.Canaria** | **Lanzarote** | **Fuertev.** | **Total** |
| **1985** | 945,42 | 83,42 | 13,59 | 6,66 | 1139,54 | 64,23 | 154,19 | 2407,05 |
| **1995** | 1937,72 | 157,45 | 34,98 | 17,25 | 2237,64 | 407,7 | 242,7 | 5035,44 |
| **2004** | 3014,67 | 236,78 | 65,69 | 33,75 | 3358,98 | 811,92 | 518,26 | 8040,01 |

Source: Dirección General de Industria y Energía Gobierno de Canarias. Elaboración propia.

| TABLE 4. **FUEL MIX IN GIGAWATT-HOUR** | | | | |
|---|---|---|---|---|
| **Year** | **Generation by Unelco** | **Self generation** | **Renevables** | **Total** |
| **1985** | 2121,6 | 282,9 | 2,5 | 2407,04 |
| **1995** | 4356,1 | 614,6 | 64,7 | 5035,45 |
| **2004** | 8040,1 | 384,4 | 340 | 8764,40 |

Sources: Dirección General de Industria y Energía Gobierno de Canarias. Elaboración propia.

Anexe 1. Milestones of reforming in Continental Europe

| | | |
|---|---|---|
| 1996 | EU-15 | European Council of Energy Ministers and Parliament reached agreement on a market liberalisation directive |
| February 1997 | EU-15 | This "*Directive concerning common rules for the internal market in electricity*" (Directive 96/92/EC) became valid while waiting up to two more years for its transposition by countries |
| 1998 | Spain | Introduction of a Spanish centralised pool |
| 1998 | Poland | Introduction of TPA (market opening: 22%) |
| 1998 | Germany | 100% market opening in one step |
| February 1999 | EU-15 | Directive went into force after a 2 years transposition delay: Market opening due the directive in Austria, Belgium, France, Italy, Spain, Portugal and The Netherlands between 30% and 35% |
| 2001 | Austria | 100% market opening (in a second step) |
| 2001 | EU-15 | Approval of the "*Directive of the European Parliament and the Council on the promotion of electricity from renewable energy sources in the internal electricity market* (RES-E Directive)" (European Parliament and Council, 2001 – Directive 2001/77/EC) |
| 2003 | EU-25 | Approval of the "*Directive concerning common rules for the internal market in electricity*" (officially Directive 2003/54; usually named "the Second Directive") |
| 2003 | Spain | 100% market opening |
| 2004 | EU15+10 | Extension of the EU to 25 member countries, new CE member countries to open their market with 30 % mínimum |

*(./.. see page 30)*

| | | |
|---|---|---|
| 2004 | EU 25 | Electricity Directive 2003/54 due to be transposed by member states;<br><br>All non domestic customers made eligible in the EU in July 2004<br><br>An EU Regulation on cross-border electricity trade came into effect (Regulation 1228/2003) in July 2004 |
| 2005 | Portugal, The Netherlands | 100% market opening |
| 2007 | EU 25 | Due to Electricity Directive 2003/54, 100 % market opening in all EU-25 countries in July 2007 |

Sources : Haas & ali (2007)

[i] Namely : Canary, Baleares, Ceuta & Melilla

[ii] The management of the high tension transport network, in practise, has included energy dispatch, with both activities known as the transmission phase or activity.

[iii] To do this, he must separate the management of the distribution network infrastructure from the commercial service that accompanies supply (billing, reading meters, other customer services, etc.). This would lead to the appearance of the supplier.

[iv] In the same way, in the establishment of traditional tariffs, crossed subsidies have been maintained between different consumers as an instrument to redistribute wealth between activities and/or consumers.

[v] The Spanish approach initially looked like being one of the most ambitious. However, the structure of the industry with two dominant producers integrated in distribution and supply was never changed. As a result, after the introduction of a centralised pool in 1998, the issue of market power exerted by the two largest incumbent generators was very soon raised see Crampes & Fabra (2005).

[vi] Any customer can opt for remaining subject to the global tariff by defect, buy directly in the market (qualified customers) or through a marketing company.

[vii] In Spain, we can highlight the nuclear moratorium, the cost of the transition to competition and the special tax on electricity, apart from the surcharge for the over-costs of SEIE systems, surcharge for renewable energies and the costs of the market and network operators.

[viii] The definition of necessary power, which will later be paid for, is made in terms of a monthly value of the probability of loss of charge, established as less than one day in 10 years. This value is equal to the mainland system and, as the White Paper on the reform of the regulatory framework for electricity generation in Spain (2005) indicates, makes the availability of a high rolling reserve capacity, which entails excessive costs, compulsory.

[ix] Special regimen generation, as it is known, encompasses facilities supplied by renewable energy, waste or co-generation resources.

[x] When the facilities come to the end of their design life, the power guarantee is reduced to the audited costs of operation and maintenance and the costs of extending the design life.

[xi] Connecting the islands with other electricity sectors, or more inter-island connections, is not economically viable at this moment in time, as the REE admits on their web site (http://www.ree.es).
[xii] Taking the Canary Island Energy Statistics (2004), in 2004, there were 83 thermal generation units between turbine and steam fired units (14 with a total of 713 MW installed), gas turbines (9 with a total installed power of 508.8 MW), diesel fired (48 with a total installed power of 438.82 MW), combined cycle (9 with a total installed power of 371.1 MW) and others (93 MW).
[xiii] As an example of such differences, in 1993 prices, the costs of supply, man power and amortisation of electricity generation was 6.86 pts per kWh sold in the national electricity grid (UNESA, 1997), while, in the Canary Islands, this cost was 10.85 pts/kWh. The main reason for this was the cost of supplies, which was 3.05 and 5.67 pt.kWh respectively.
[xiv] In practise, this situation continued up until April 2006, which is when the energy transport and dispatch network management was bindingly conceded to an independent operator.

[xv] As the CES-Canaries annual report (2002) indicates, the electricity consumption indexes in the Canary Islands, that is consumption per inhabitant or per GDP unit, still show major absolute differences in comparison with national average values.

[xvi] This decree put an end to regulatory uncertainty in the Canary Island electricity sector as the LSE makes electricity planning indicative, except for transmission facilities, while the Canary Island electricity sector law 11/1997 gave the Regional Government competence for the short and long term planning of generating facilities and of the transmission and distribution of energy. The final solution has meant that planning is done in accordance with the regional government in co-ordination with the central government.
[xvii] Currently, 20% of the market energy (almost all are major accounts) has opted to receive the service through the eight suppliers that operate in the Canary Islands.
[xviii] In this study, we do analyse each island system in detail, but it seems obvious that measures of this kind only make practical sense in island systems of a certain size, like those of Tenerife, Gran Canaria and Fuerteventura-Lanzarote.
[xix] New production technologies have made it possible to use small sized, competitive high-energy performance units. Ramos-Real (2005) indicates that many empirical studies show that economies of scale are exhausted these days for different technologies at far from high levels of production.