



## **Appendix IV: National report for Spain**

Fernando Manzanares, July 1999

International Energy Agency Demand-Side  
Management Programme  
**Task VIII: Demand-Side Bidding in a Competitive  
Electricity Market**

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## 1 Summary

### BODIES INTERVIEWED

**Market Operator** - OMEL

**System Operator** – Red Eléctrica de España (REE).

**Regulatory Institution** – MINER (Ministry of Industry and Energy).

**Regulatory Institution** – CNSE (National Electric Systems Commission).

**Transport Network Operator** – Red Eléctrica de España (REE).

**Marketing Corporation** – Hidrocantábrico Energía.

**Marketing Corporation** – Endesa Energía.

All the participants in the Spanish market consider that DSB products are suitable for Spain and have expressed their interest in introducing them.

Due to the significant, potential economic returns that this type of products can offer, its introduction will arouse more interest in the customer than in the power generating companies.

In respect of the DSB programmes, the current situation within the Spanish market is as follows:

- Market regulations provide the demand side with the necessary supplying capacity, i.e., the DSB products can be introduced into the Spanish market.
- The demand side is taking advantage of this capacity.
- Up to the present moment, the only objective pursued by the demand side was to satisfy its estimated energy consumption at the lowest possible cost, including deflection management. For the time being, the demand side has not studied a reduction of the energy that provides additional income and, at the same time, advances environmental restoration.

The main objections stated by the participants, in respect of Demand Side Bidding, were related to the lack of information concerning DSB as well as its economic and environmental incentives. Also considered important were the costs of these measures for the small and medium-sized customers, the real nexus between the power generating and marketing companies, the problems involving monitoring and billing, the potential speculative use of these products by the demand side and the fact that the Spanish market may not be sufficiently mature for the introduction of these products with a 100% success rate.

Likewise, the interviewed parties concur that the DSB products could operate at present in the Spanish market. The following products are currently available:

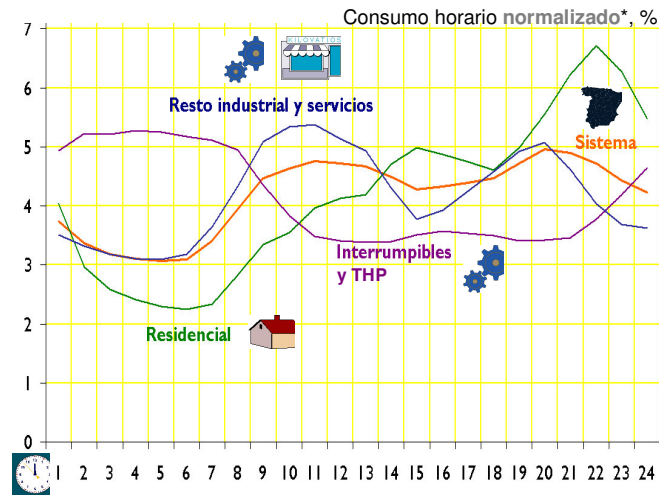
- Energy trading
  - ✓ Day ahead market: The purchase and sale of the energy needed for the following day is traded.
  - ✓ Intradaily market: The market agents carry out the necessary trading adjustments during that specific day.
- Balancing market.

Finally, although the interviewed bodies concur that the introduction of DSB products could increase the environmental benefits, there are disagreements concerning which are the benefits. In this respect, the MINER (Ministry) openly states the environmental benefits that have been achieved to this day, whereas the System Operator, especially CNSE (a consultative regulatory institution) considers that few environmental advances will be achieved.

## 2 Structure of the Electricity Market

Throughout 1998, the Spanish consumers demanded 173.071 GWh of **end energy** in **b.c.** from the system. During the last ten years it has increased 34%, at 3% interannual rate.

The average **hourly demand** during 1.998 was 19,7 GW, although this value varies substantially depending on the day. The consumption measured during the **peak hour** of the system, which is invariably between 7 and 8 in the evening of a very cold winter workday, is double the amount registered during the least consumption hour.



System load curve of any given winter workday.  
Electric Network 1999 Guide of the electric system

During 1.998 the peak hour was registered on December 9<sup>th</sup> with a consumption of 29.484 MW.

The distinguishing features of the structure of the Spanish electric sector (in words of the consultative regulatory institution CNSE) are that it is a fully, privatised sector in which the generation, transport, distribution, marketing, system operation and market operation activities are independent. It is moving towards the progressive liberalisation of the market (with annual power consumption greater than 2 GWh per year, equal to approximately 5.000 customers). It includes a competitive, wholesale market, where it is not incumbent to buy at, that coexists with a regulated rate. The preceding points are defined in the Electricity Law 54/1997 dated November 1.997. The production market regulations are developed in the R.D. 2019/1997 dated 26<sup>th</sup> December and in the Electric Power Production Market operating Regulations dated February 12<sup>th</sup>, 1999.

The most important features of the Spanish electricity market are the following:

- Freedom to establish generation.
- The electric products and services subject to competition are: power, secondary and tertiary control services and balancing market. The processes by which these services compete are:
  - At the daily market where the energy trading of the following day is carried out according to a timetable. All the energy cancelled is liquidated at the marginal price.
  - At the intraday market (currently there are 6 sessions) where the agents adjust their trading.

- Between 300 and 600 MW are reserved for the secondary control, and the response time must be less than 5 minutes; (63% in less than 100 seconds and 100% in less than 5 min.). The agents are paid for their availability and the energy cancelled.
  - The tertiary control does not have an upper or lower limit and the response time should be less than 15 minutes. The agents are paid only for the energy cancelled.
- The process is performed on an hourly basis.
- The geographical area in which the market operates is mainland Spain.
- The main features of the transport network are the following:

Year 1998	Transport Network			
	Units	Electric Network	Other companies	Total
Circuits	Km			
400 KV		14.278	260	14.538
200 KV		4.280	11.521	15.801
Total		18.858	11.781	30.339
Transformation capacity	MVA			
400/AT		16.988	25.699	42.687
International Interconnections of the Electric Network				
	Rated thermal capacity, MW			
France		4.118		
Morocco		730		
Portugal		4.190		
Andorra		90		

#### Services provided by the international interconnections

	Trading capacity in winter		
	France	Portugal	Morocco
Maximum capacity, MW	4.118	4.190	730
Capacity reserves that ensure the reliability of the Interconnections and interconnected systems, MW	3.368	3.440	430
Energy trading capacity in MW			
- for exportation	750	750	300
- for importation	750	650	300

- The following table details the participants in the Spanish electric market:

<b>PARTICIPANT</b>	<b>NAME</b>
Market operator	OMEL
System operator	REE
Regulatory institution (Ministry)	MINER
Regulatory institution (consultative)	CNSE
Transport Network Operator	REE
Marketing corporations	Six
Distributors	Eight
Power generating companies	4
Transport companies	5
Extern agents	4

The main responsibilities of the Market Operator are Counterpart to participants on the market place, Clearing, Organising ancillary services, Education, Market monitoring, Market maker, Consulting and Settlement of all non-regulated electricity activities.

The System Operator will receive the results of the cassations provided by the Market Operator and, in turn, shall submit the measurements of the trading carried out to the Market Operator. The System Operator and the Owner of the Transport Network are the same company.

The main responsibilities of the System Operator are: prediction of the system's behaviour for different periods of time, measurement of all the transactions, operation services market management, evaluation of network access, transport network management that should be co-ordinated with production and carrying out the operation in real time.

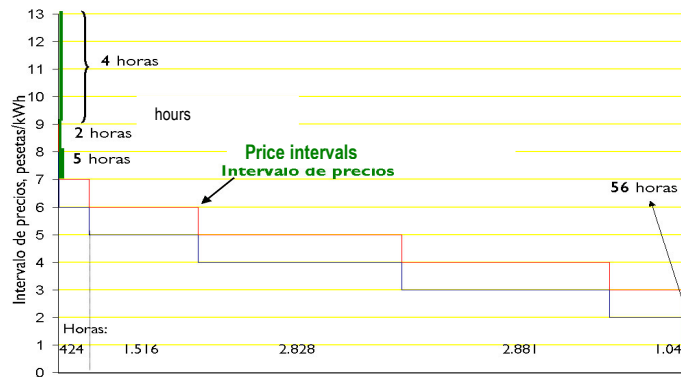
The ancillary services that require REE's intervention are the secondary and tertiary control, resolution of the technical restrictions, balancing market, voltage control, primary control and independent start-up. The first four services are assessed through tenders and the other services are awaiting regulations.

The eligibility schedule in force for the Spanish market is as follows:

DATE	CONSUMPTION
1/01/98	> 15 GWh/Year
1/01/99	> 5 GWh/Year
1/04/99	> 3 GWh/Year
1/07/99	> 2 GWh/Year
1/10/99	> 1 GWh/Year
1/07/00	All the high voltage.
2007	All the customers

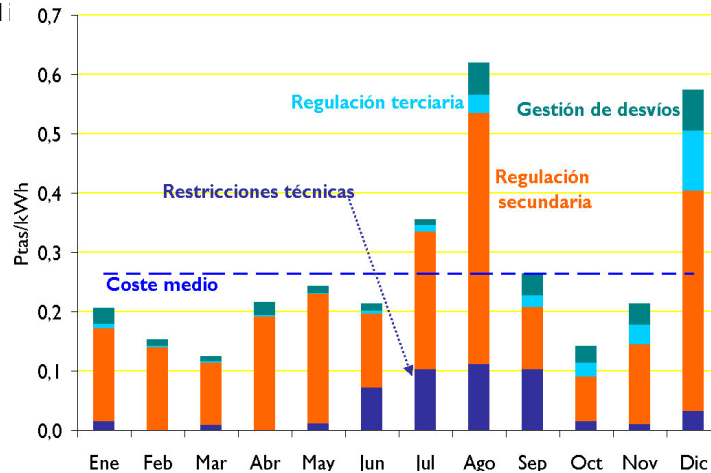
Hours in which each daily market price slot has been maintained.

Year 1.998.  
Electric Network  
1999 Guide of the electric system



Cost of each operation service sold in the production market.

Year 1.998.  
Electric Network  
1999 Guide of the electric system



It is easy to change from one marketing corporation to another (some paperwork has to be fulfilled). The following main changes to the Spanish market have been proposed: enhancements of market regulations, adequate development to ensure supply (DSB plays a major role in this aspect), interconnection management, payment of an interconnection and transit fee, operation under overload conditions, creation of new markets and the anticipated speeding up of the eligibility schedule. The participants concur, almost unanimously, that there is a need to fully develop the approved regulations rather than to implement changes to the current structure. In addition, REE considers that there is a need to create, at European level, an institution that would co-ordinate all the TSOs.

### 3 Experiences with Demand Side Bidding

The following demand side groups are currently participating in the Spanish market:

- In the daily market: The distributors of customers with a regulated rate, the marketing corporations that integrate eligible customers and the eligible customers that operate directly in the market (currently two). This is the market in which the day ahead trading takes place and the secondary and tertiary offers are submitted.
- In the intradaily market (currently 6): All the market agents (power generating companies, distributors, marketing corporations and eligible customers that operate directly in the market) can trade in the energy cancelled during the preceding daily or intradaily markets in order to regulate their needs.

The products susceptible of use by the demand side that can be found in the Spanish market, in compliance with the DSB programmes, are basically two: Energy Trading and Balancing Market.

However, of all the demand side groups, only the marketing corporations that integrate the energy requirements of the end customers (eligible customers) and the distributors who act as “pass through” for their rated customers make use of these two products. Furthermore, the marketing corporations do not use these DSB products to effectively reduce the demand but rather, they simply try to cover the estimated power supply requirements at the lowest possible cost, that is to say, with the least amount of deflections. To this effect, the marketing corporations try to build up a customer portfolio large enough to compensate the deflections of one customer with those of another. The marketing corporations do not penalise the eligible customers when they deviate and, in some cases (depending on the consumption level), the marketing corporations are not even aware of the load curve of their customers.

The deflections are penalised in the wholesale market and are paid, in proportion to the amount of the deflection, by all the market agents, and at the kWh price established by the reserve market, which is the most expensive rate.

The minimum duration of a contract between a marketing corporation and an eligible customer is one month. No dues have to be paid for either the availability or its use. The common practice is to enter into a contract with the eligible customers at a pre-established kWh price. There are very few cases in which the agreed price is indexed to the resultant market price.

The energy is bought on a daily basis in 24 blocks, thereby each block is related to one of the 24 hours of one day.

The customer load monitoring facility is at the developmental stage and shall be carried out by remote measurement.

To the present day, these are the experiences with DSB products that have been developed in the Spanish market. I would like to highlight that some interviewees have mentioned some DSB products as future DSB products in Spain although currently they are not present in our market. They are:



- **Operating reserves**: At the present time there are secondary and tertiary reserve markets but the demand side does not participate in them. We expect that rate interruptibility will be replaced in the future by the participation of the demand side in these markets.
- **Reactive power**: Future regulations will establish limits to the distributors power factor for each transport network connections. Therefore, the voluntary participation in the reactive power supply shall be carried out through the market.
- **Voltage control**: The MINER is promoting the creation of a system that will reward the qualified consumers and the distribution network distributors/managers for their assistance in voltage control. It would be commissioned in different stages and the first stage would involve the supply units and, possibly, qualified consumers. It would subsequently include the transporters and distributors.

#### 4 Views towards Demand Side Bidding

• INTERVIEWEE	• Advantages of DSB	• Environmental benefits	• Other Remarks
• OMEL (Market Operator)	• Presence of new products, market with a larger influence and participation of the demand side and network and a more efficient system operation.	• No comments	• -----
• REE (System Operator, Manager and Owner of Transport Network)	• More efficient market, network and system operation and more efficient use of energy and power.	• Reduction of CO <sub>2</sub> emission.	• REE believes that the consumers who suffer network access problems due to problems with their peak capacity or overload will accept their demand to be managed in order to have access.
• MINER (Ministry)	• Contributes to energy efficiency	• To fulfil energy and environmental policies.	• The MINER does not think that the power generation system agents in Spain will obstruct the adoption of DSB programmes nor does it consider that there are technological obstacles nor the current rate structure would hinder the implementation of DSB programmes.
• CNSE (Consultative Regulatory Institution)	• Did not reply.	• It is not efficient in for the reduction of CO <sub>2</sub> emissions.	• According to the CNSE, the demand side can participate in the daily and intraday markets, in the deflection markets and in the physical bilateral contracts under the same conditions as the supply side. The marketing corporations and the qualified customers react to electricity pricing in order to reduce their intraday market costs and, in addition, the distributors will be incentivized to buy cheaper through balancing market.
• Hidrocantábrico Energía (Marketing Corporation)	• More business opportunities and a market with a stronger demand side leverage.	• Reduction of CO <sub>2</sub> emission.	• Considers that the market is still in its incipient stage and unprepared for customer participation in DSB programmes notwithstanding that in the distant future it could develop specific products for customers with similar characteristics. They feel that the DSB programmes will activate the market because more energy repurchase operations will take place. The load control will be carried out through remote measurement and load monitoring is in a developmental stage.
• Endesa Energía (Marketing Corporation)	• More business opportunities and a market with a stronger demand side leverage and participation in the demand side market and network and more efficient system operation and more business opportunities.	• Reduction of CO <sub>2</sub> emission through the promotion of energy efficiency.	<ul style="list-style-type: none"> <li>• EE believes that customised products for customers with similar characteristics can be developed, especially in the timetable differentiation measures. Likewise, EE feels that the liberalisation of the household will stimulate the use of DSB programmes, notwithstanding that the sector is still unprepared. DSB will lead to uniform pricing, it will be a market maturity indicator and it will reduce risk management although it will complicate the design for the contracts in force.</li> <li>• EE does not control its customer's load nor does it have the technical means to do so. In respect of load monitoring, it is carried out by remote measurement.</li> </ul>

## 5 Barriers to Demand Side Bidding

• INTERVIEWEE	• Barriers/Disadvantages of DSB
• OMEL (Market Operator)	• In their opinion, there are no drawbacks for commissioning DSB products.
• REE (System Operator, Manager y owner of the Transport Network)	• Difficulties involving control and billing.
• MINER (Ministry)	• Potential speculation by the demand side under situations in which restrictions or supplementary services must prevail over technical and economic efficiency.
• CNSE (Consultative regulatory institution)	• Information and measurement costs for the small and medium-sized customers, the nexus between the power generating companies and marketing corporations, low eligibility to the present day, admission barriers for new marketing corporations and scant incentives for the distributors to buy at low prices.
• Hidrocantábrico Energía (Marketing Corporation)	• The customer has the habit of not modulating its load according to the price.
• Endesa Energía (Marketing Corporation)	• More difficulties and complexity for monitoring and billing.

## 6 Discussion

The opinion of the participants in respect of the costs, advantages, drawbacks and benefits that DSB can afford to each agent, the environmental benefits and the Demand Side Bidding barriers have been expounded in items 4 and 5 of this summary.

The demand side market agents are interested in DSB, especially the consumers. However, this interest depends on the benefits offered by DSB. Logically, the power generating companies are the agents least interested in DSB.

The main concern of the regulatory institution is whether the introduction of DSB could undermine opportunistic behaviours that only benefit some demand side groups without enhancing the system's efficiency.

Energy trading and balancing market are the two DSB products currently available. These products can be accessed through the daily market and in the six intradaily markets.

The rate structure in force for the regulated market offers substantial discounts to the key accounts if, at the request of the System Operator, they reduce their consumption during specific periods. Logically, these incentives should be negotiated in the electricity market and transferred to the rated market customers by means of discounts applied by the distribution companies.

Future DSB products are voltage control, reactive energy and interruptibility for the secondary and tertiary reserves.

The main barrier for developing DSB would be a market with low benefits because the customer would not be motivated to modify its consumption habits. On the other hand, product control and billing would be hindered.

The metering equipment cost hinders the participation of the small and medium-sized consumers in the electricity market, thereby in the DSB.

The participants unanimously agree that DSB will contribute to a more efficient market with more demand side leverage, although there are doubts as to which would be the environmental benefits.

In order to ensure a satisfactory introduction of the new DSB products, the electricity market must mature.

## 7 Conclusion

The main conclusions of this report are the following:

- The Spanish electricity market offers a high potential for DSB product development. Energy trading and balancing market are already available for the demand side groups, however these products are being used in a comprehensive manner and to the extent that it safeguards the estimated energy requirements.
- The development of DSB products, understood as a change in the demand habits of a customer or group of consumers, requires a more mature market that would ensure sufficient benefits to compensate the costs and inconveniences, inherent to the modification of consumption habits, that have been sustained by the demand side agents.
- In order to develop new DSB products, the market would require new regulations. These regulations should prevent opportunistic behaviours that do not enhance the system's efficiency.
- During the initial stage, only the large consumers and the marketing corporations can participate in DSB. The cost of the metering equipment and the difficulties involving the control and billing of products hinders the participation of small and medium-sized consumers. However, they could participate through the distributors if the latter transfers the DSB benefits to the consumer by applying discounts. The commissioning of the 2<sup>nd</sup> stage is considered important because the combination of an in-depth analysis of the DSB programmes, from the customers point of view, together with a study of the electric technologies within the household, retailer and industrial sector would allow us to draw conclusions regarding DSB potential for each situation.
- It is hard to assess which are the environmental benefits of DSB and its contribution in the reduction of CO<sub>2</sub> emissions. The interviewed bodies could not reach a consensus to this regard.
- In our opinion, DSB is an efficient mechanism offered by the market systems in order to:
  - ◆ Allow the market to attain its true dimension. The market can only operate if the demand side is aware of the market price.
  - ◆ Adjust the energy demand to its efficiency level. In this manner, the marginal costs of production will be equated to the marginal benefits afforded by the energy, thus preventing the distorted price indicators produced by the system's inefficiencies.