

Subtask 5- Spanish Technology Case Study

SP TECH CASE #4: INTERRUPTION FLEXIBLE MANAGEMENT PROGRAM (IFMP) TECH

A. Brief Overview

Since 2002 a new Interruption Flexible Management Program (IFMP) has been development by REE (Operator System) in collaboration with large industrial consumers. We expect that the system initiate operations in December of 2004; although right now some delays could delay the proposed date.

The high security specifications emitted by the communication and control measurement hardware will allow the consumers to offer more complex services in the future. Accomplishing this, the participation of the demand will be increased.

Additionally, IFMP system increases the technical relation Consumers-System Operator. The system allows the collaboration between consumers and REE in the knowledge and development of Demand Response about its potential, prediction and certainty.

B. Description of the DR Technology

I. Requirements

Requirements of participation:

- To be supplied under a general tariff in high tension.
- To Offer an interruptible power (Pmax) greater that 5MW, in the case for off-peninsular systems smaller powers can be admitted.
- To have the adequate measurement hardware.

The flexible interruptibility types are shown in the following table:

Flexible Type	Characteristic,
A	<ul style="list-style-type: none"> • A maximum period of four continuous hours, decided by REE, when the company reduces its consume in Pmax stipulated in the interruptibility contract. • Another period lasting a maximum of four continuous hours, decided by REE when the company reduce its consume only 50 per cent of the Pmax. • All the other twelve hours, the company shall be free to maintain whatever

	<p>capacity it has contracted.</p> <ul style="list-style-type: none"> • REE shall state explicitly, giving minimum advance notice of two hours for the profile of the twelve hours of interruption. • The minimum advance notice to order a company to keep to the Pmax limit can be no less than one hour.
B	<ul style="list-style-type: none"> • A maximum period of three continuous hours, decided by REE, when the company reduce its consume in Pmax stipulated in the interruptibility contract. • Another period lasting a maximum of three continuous hours, decided by REE when the company reduce its consume only 50 per cent of the Pmax. • All the other six hours, the company shall be free to maintain whatever capacity it has contracted. • REE shall state explicitly, giving minimum advance notice of two hours for the profile of the six hours of interruption. • The minimum advance notice to order a company to keep to the Pmax limit can be no less than one hour.

The number of interruptions that a client can be submitted is limited by:

- 30 maximum annual interruptions.
- An interruption for day.
- Five interruptions each week.
- 120 monthly hours.
- 240 annual hours.

II. IFMP Operation

The System Operator is responsible of the Management System: is in charge of emitting, controlling and supervising all orders of interruption, change and/or annulment.

The participating consumers will communicate to the System Operator and its Distribution Utility, an hourly energy demand program for the following two months. Besides it will communicate the dates predicted of maintenance and/or stop of their installations although they be out of the time limit of two months before mentioned.

The hardware used by Customers and the Operator System should be provided with surveillance and supervision communications elements, in order to generate and to transmit the corresponding alarm signs that to facilitate to the SGFI the elaboration of the necessary conditions for the correct decision take and application of the interruption orders.

III. Measurement Hardware

The consumer's measurement hardware will provide information of the energy demand in real time. Besides, it should be capable to send to the System Operator acknowledgement of the state of orders of interruption: its change and/or annulment. The measurement hardware will be also formed by current and voltage transformers, sign converters and conditioners, besides they should be formed al least by the following:

- A Maximum-Power meter with integration periods of fifteen minutes.

- A Maximum-Power meter with integration periods of five minutes, synchronize with the start of the power reduction period that correspond with an interruption that register the maximum power demanded by the same.
- Internal clock that indicates the date and hour of the measures registered by the maximum-power meter.
- Manual Access to print demand data of the last interruption registered every five minutes.
- A communication unit for the reception of interruption orders, its change and/or annulment and for the emission of the corresponding acknowledgements, for the emission of analogical measures of active and reactive power in real time files with demand programs and files with data measures collected after each power interruption order.

IV. Communication Hardware

The communications of the SGFI will be carried out through a solution with IP-VPN, Virtual Private Network based on Internet Protocol, with the following characteristics:

- Establishment of a VPN service without a direct connection to Internet.
- The topology of the service will be a Star with the traffic concentrated in a central point located in the System Operator's workplace.
- The central point will be connected to the private network with redundancy lines dedicated using preferably Synchronous Digital Hierarchy (SDH) or Asynchronous Transfer Mode (ATM).
- User's data link requirements of the SGFI should comply with the following minimum requirements: technology of Asymmetrical Digital Subscriber Line (ADSL); 128Kbps network connection; 256 Kbps user connection; 10% traffic guarantee with a permanent connection.
- They should be protected by backup line that should be connected preferably to an Integrated Services Digital Network (ISDN)

V. IFMP Capacity and Experiences during operations

The total interruption capacity of the system is esteemed in 2600MW approximately. The instant interruption capacity is considered greater to the 1000MW. The capacity to absorb or to deliver energy revives of transport network is over 500MVA_r.

Currently the total MW by step of interruptible power offered is observed in the following table:

Rank of Power	Total power offered (MW)	Percentage on the total power offered
$P_{interruptible} > 50 MW$	615.080	25,71%
$25 < P_{interruptible} \leq 50 MW$	199.100	8,32%
$15 < P_{interruptible} \leq 25 MW$	214.117	8,95%
$10 < P_{interruptible} \leq 15 MW$	519.861	21,73%
$5 < P_{interruptible} \leq 10 MW$	576.651	24,11%
$P_{interruptible} = 5 MW$	210.000	8,78%
$P_{interruptible} < 5 MW$	57.362	2,40%
TOTAL	2392.171	100%

Source: REE

Table 1.- Total interruptible power offered by rank of power

In the next figure we show an example of the consumer response in attention of a REE Interruption order.

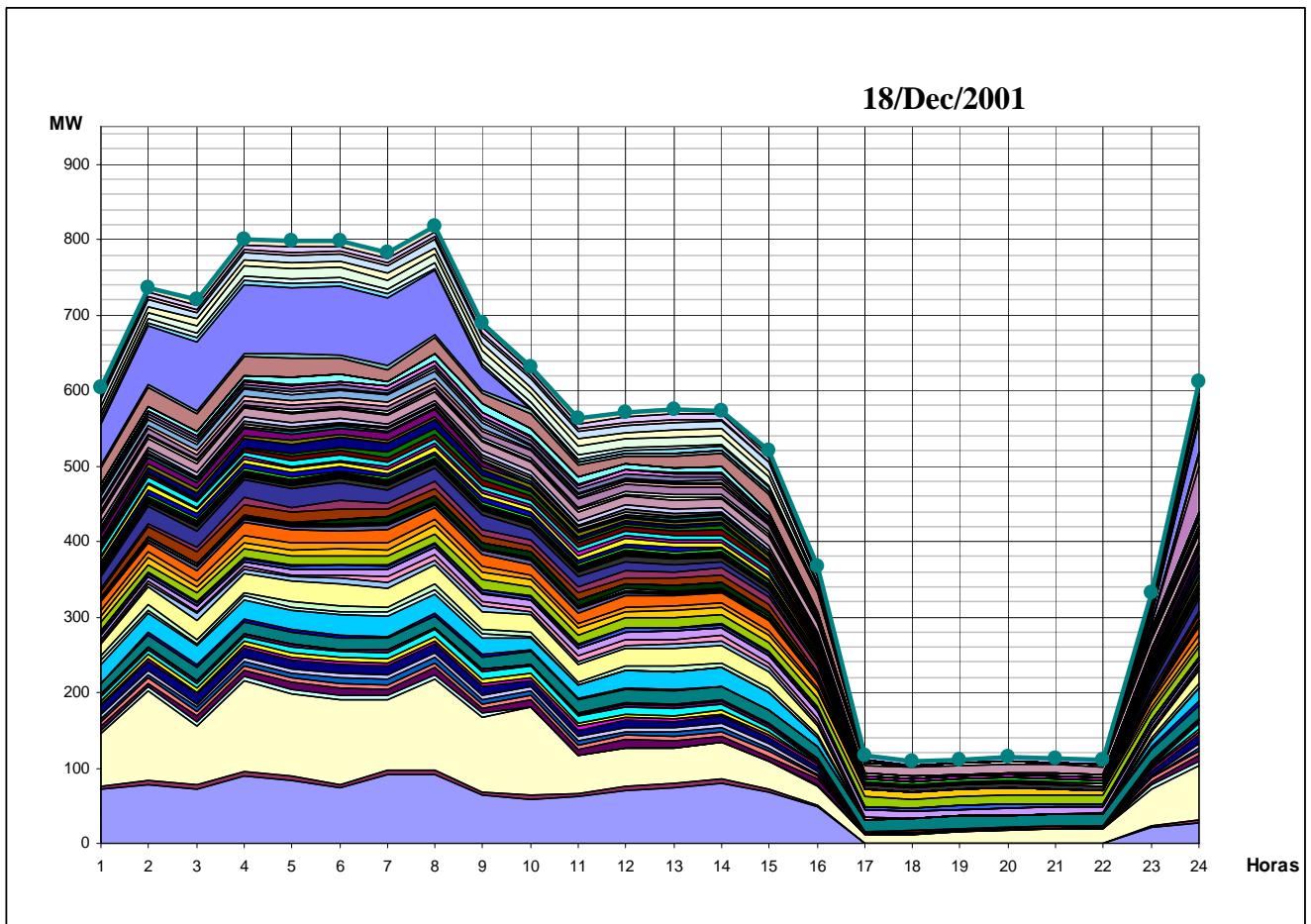


Figure 1. Consumers Load Profile in response of a REE Interruption order in December 18, 2001.

C. Further Information

www.ree.es