

## THE CHARTER OF ELECTRICITY SUPPLY IN ITALY

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### ABSTRACT

*The report describes the Charter of Electricity Supply, introduced by government in Italy since 1996.*

*The different steps which led to the formulation of the Charter are described.*

*Then the indices dealt with by the Charter are examined, subdivided into indices concerning the period before, during and after the contract, general and specific indices, declared and binding indices. For quality of supply indices average values are given for urban, half-urban and rural areas, whilst for quality of relations indices maximum values for each individual customer are required.*

*Finally the discussions between ENEL and the relevant Authority, concerning the quality of supply and the economic cost of quality maintenance and improvements, are presented.*

### INTRODUCTION

The Charters of Public Service contain the declared values (standards) that the different companies charged with a specific public service are able to assure to their clients.

The aim of the Charters is therefore to inform the clients about the present level of service provided by the company.

The main subjects involved are the companies, who establish the standards according to the results of operation in last years and to the forecasts of improvement for the present year, and the clients, who can compare the level of service offered by the company to their needs and, if it is not satisfactory, take some measures to fill the gap.

In this contest the role of the Regulator (Authority) for each specific service is of general support: its task is mainly to ensure comparable definitions and methods of measurement and processing of the indices, to gather information from the different Charters issued and almost information derived by the yearly operation reports that each company is bound to deliver. In this way a statistical comparison becomes possible between declared and obtained values for each company and also comparison among different companies can be made.

Leaving aside the Charter of Public Service, the main role of the Authority is to establish the tariffs for its sector, taking into account specific standards of quality of service, decided by the Authority itself and that must be respected, and / or suitable finance aids to sustain the plans / results of improvements in service quality presented by each different company.

In this contest the main subjects involved are the Authority and the companies, whilst the clients represent the final

destination of Authority and companies efforts in improving service quality.

### PRELIMINARY ACTIONS TO ISSUE THE SCHEME OF THE CHARTER OF ELECTRICITY SUPPLY

The law n.400 of August 1988 entitled the Prime Minister to issue directives to ensure impartiality and good results of public administration and to push companies and public administration to follow the objectives established by the law and the political and administrative addresses of the government.

On January 1994 the Prime Minister issued the directive “Principles on providing public services” that specified the criteria to be followed in the respect of effectiveness and impartiality and of the requirements of the citizens. The directive asked the providers of a public service to focus the factors responsible of service quality and, on that basis, to select and issue quantitative standards of quality, whose respect could be ensured. These standards had to be described in a specific document called “Charter of Public Service”.

The law 163 of May 1995 established that the Prime Minister issue the general scheme of the “Charter of Public Service” and that the providers of public service must issue their own Charters, on the basis of the general scheme, not later than 120 days from the issue of the general scheme.

On May 1995 the Prime Minister established the following sectors, formerly bound to issue the Charter: water, social care and provisions, communication, electricity, gas, education, health, transportation.

On September 1995 the Prime Minister issued the general scheme of the Charter of Electricity Supply.

### THE GENERAL SCHEME OF THE CHARTER OF ELECTRICITY SUPPLY

The Charter was initially intended to be applied only to low voltage domestic clients and general supply services of residential buildings, but soon it was extended to all LV customers. Nevertheless also MV and HV customers, as far as continuity of supply is concerned, can take information about their level of quality of supply, that will be greater or equal to that declared in the Charter.

The Charter is applicable in normal operating conditions, as defined in the European standard EN50160: abnormal conditions such as earthquakes, exceptional snow, floods, strikes, acts of public Authority, etc. are excluded.

Many classifications of the standards can take place.

A first subdivision of the standards take into account the type of relations between customer and provider of the service:

- preliminary or subsequent actions in respect of the contract (estimates of connections, investigations of the site, connections, putting on operation, putting off operation)
- operation of the contract (billing, amendments, tardiness, inspections on meters and on technical characteristics of supplied voltage, trouble calls, continuity of supply, as number and duration of interruptions, whether or not notice is given in advance to the customers, and time of notice)
- relational aspects concerned with the access to the service (drawing up and dissolution of the contract, handling matters by telephone, different ways of payments, facilities for some categories of clients, respect of appointments agreed, information to customers, timetables of counters, waiting times at counters, answers to written questions and complaints)

Another classification of the standards is based on the subject to which the result of the standard is addressed:

- the general standards represent quality goals concerning the *average* performance of the provider against all customers; the provider does not declare the individual performance for each customer; the customer cannot directly verify the respect of the standard
- the specific standards represent quality goals concerning *each individual* customer; the customer knows from the provider the individual performance of the service for which he is concerned and can verify the respect of the standard

The specific standards are subdivided into two groups:

- the declarative standards for which, in case of no respect of the standard, the provider has to answer to the Authority
- the binding standards for which, in case of no respect of the standard, the provider has to pay a forfait indemnity (between 25 and 35 EURO) on customer written request

A third classification of the standards takes into account the type of phenomenon described by the standards:

- relation standards, that are the great majority of the standards, are such that the respect of the declared value is nearly completely in the hands of the provider of the service. Only adjustments in internal organisation are sometimes required to achieve the result of respecting the declared values. These interventions are not so expensive and can be obtained in a short time. For this kind of standards a maximum value, not to be exceeded, was generally chosen
- network standards, that are the standards concerning the continuity of supply (number and duration of interruptions due to faults), are not completely in the hands of the provider of the service. In case of overhead network (in Italy 2/3 of MV network is

overhead) from 30% to 60% of accidental interruptions depend on atmospheric causes (lightning, humidity, salt and industrial pollution, wind, rain, etc.) and these normal operating conditions vary a lot from year to year.

Moreover considerable investments are often needed to improve the performance of the network and this takes a lot of time.

From the above mentioned reasons it was chosen to classify the standards concerning the continuity of supply as general standards rather than specific ones and it was allowed to indicate for such standards average values rather than maximum values not to be exceeded.

## **THE CONTINUITY OF SUPPLY INSIDE THE GENERAL SCHEME OF THE CHARTER**

The continuity of supply is defined inside the general scheme of the Charter in terms of average number of interruptions per year and average duration of each single interruption.

The interruptions are subdivided into two groups:

- interruptions for which no notice is given in advance to the customers ; they are accidental interruptions, resulting from faults occurring in the network or not assessed causes, and short prearranged interruptions, for which no notice is given in advance to the customers
- interruptions for which notice is given in advance to the customers ; they are long prearranged interruptions, resulting from works, maintenance, operation, etc.

Taking into account that interruptions are strongly dependent both from external events (atmospheric conditions) and from the structure of the MV network itself (the MV network in Italy is responsible of about the 85 % of continuity of supply both in terms of number and duration of interruptions) the general scheme of the Charter introduces the concept of assigning number and duration of interruptions for different types of populated areas:

- the urban areas are the areas in which the lowest number of interruptions due to faults and also the lowest duration of each single interruption are expected, taking into account that in these areas the strong density of load economically justifies to build MV networks almost in cable, without laterals, and that a complete re-supply is guaranteed in case of an upstream fault
- the half-urban areas are the areas in which intermediate values of number and duration of interruptions are expected, taking into account that in these areas the density of load economically justifies to build MV mains with a complete re-supply, but that these networks are also characterised by laterals, almost overhead, with no re-supply capability

- the rural areas are the areas in which the higher number of interruptions due to faults and also the higher duration of each single interruption are expected, taking into account that in these areas the weak density of load economically justifies to build MV networks almost overhead with laterals, and that no re-supply is guaranteed in case of an upstream fault

It appeared soon clear that the concepts of urban, half-urban and rural areas had not to be strictly tied to the type of MV network of the provider of the service but that a more neutral reference had to be found in some organisation of the State.

Therefore it was decided to utilise the list of "inhabited areas" provided on a geographic basis by ISTAT (National Institute for Statistics).

ISTAT set the borders of "inhabited areas" on maps (scale 1:25000) provided by the IGMI (National Geographic Military Institute) according to the distances between consecutive buildings: if the distance is below a certain threshold, the two buildings belong to the same "inhabited area", otherwise they belong to two different "inhabited areas" or are classified as scattered houses.

On that basis, the following definitions of populated areas are retained:

- urban areas are the "inhabited areas" with more than 30000 inhabitants
- half-urban areas are the "inhabited areas" with less than 30000 inhabitants and more than 10000 inhabitants
- rural areas are the other "inhabited areas" including scattered houses

In many cases, to simplify the application of this concept, it was accepted to assign to the whole area of the Municipality the character of its most populated "inhabited area". This leads to consider urban also all rural and half-urban areas inside an urban Municipality, or to consider half-urban also all rural areas inside a half-urban Municipality.

With reference to what said above "inhabitant" are considered the persons who formally declare to live in a certain Municipality. Nevertheless in case of holidays areas, very crowded during holidays and less populated in the rest of the year, despite the formal declarations to Municipalities, the most populated period of the year is selected to assess the belonging of the area to one of the three above mentioned categories.

## FIRST TWO YEARS OF APPLICATION OF THE CHARTER

On January 1996, all electrical utilities published the Charters of Electricity Supply, according to the general scheme issued by the Prime Minister.

In the case of ENEL it was decided to issue 147 Charters (one Charter per each Zone). The Zones are the territorial units in ENEL responsible for MV and LV distribution networks. Normally a Zone corresponds to a Province, but, in case of very large populated areas there are also Zones

corresponding to Municipalities. All the Charters are identical in the scheme. They differ only for the values assigned to the standards that change from Zone to Zone taking into account the different level of supply that at present ENEL is able to offer in the different regions of the country for historical, social, geographical and environmental (atmospheric events) reasons.

In the case of other utilities just one Charter per utility was issued.

Summarising, the main differences among the different Charters issued in Italy concern:

- some indices, that in certain cases are split into two or more elementary indices or, on the contrary, are grouped into one synthetic index, to allow consistency with the present information system of the company
- the declared values for the different indices (standards).

Tables 1 and 2 show the average ENEL situation in 1997 concerning the general standards of continuity of supply and the specific standards of relations.

**Tab 1: 1997 ENEL results for general standards of continuity of supply**

General standards of continuity of supply		% respect (n. Zones)	Average values	Declared values
n. accid. interr.	Urban	91.2	2.4	4.1
	Half-urban	91.8	3.6	6.8
per LV custom.	Rural	85.7	5.8	9.9
	Total	89.6	4.3	8.3
Average duration of each int. (m)	Urban	99.3	45	79
	Half-urban	100.0	42	98
	Rural	100.0	45	127
Total		99.8	45	119

**Tab 2: 1997 ENEL results for specific standards of relations**

Specific standards of relations (n. of days)	% respect (n. Zones)	Average values	Declared values
Estimates of connect.	98.2	15.8	25-60
Connections on appoi.	99.9	5.5	30-80
Putting on operation	99.8	1.3	7-20
Putting off operation	99.8	2.8	12-15
Answ to writt. Queries	93.5	16.7	28
Answ. to complaints	92.8	20.2	30
Billing corrections	99.1	11.3	45
On oper. tardy custom.	99.7	1.0	1
Meter inspections	97.4	9.9	20
Voltage inspections	98.8	9.7	20

The average operation results are approximately about the 50% of the declared values both for relational and network standards.

The same of ENEL can be said for the other utilities with respect to the average and to the percentage of respect of the standards.

Taking into account these results and also that in the first 3 years of application of the Charter (1996, 1997, 1998) no change at all took place in the declared standards, the

Authority is asking for a revision of the declared standards to reduce the gap between declared values and results, bringing the declared values closer to the results of operation, and to improve the declared values, year by year, following the improvement of the results.

But the most important critic of Authority concerns the strong differences on the results of operation between North, Centre and South of Italy. The efforts must be oriented to reduce the gap between the different Regions, Provinces and Municipalities for the same kind of area: urban, half-urban, rural.

In any case, as far as the continuity of supply standards are concerned, the environmental conditions (atmospheric events) must be taken into account and also the cost and time necessary to reduce the gap.

As already said, it looks easier to reduce the gap in the short time only for relational standards.

ENEL, taking occasion from its internal reorganisation in the domain of distribution, is going to issue for the present year 74 new Charters (one for each new structure called Operation). These new Charters will replace the existing 147 ones (one for each previous Zone) with the aim:

- to show a less spread and a more compact picture of electrical supply in Italy reducing the number of Charters (50%)
- to declare values closer to the results assuming for binding standards values with the probability of 99.5 % not to be exceeded, for declarative standards values with the probability of 95 % not to be exceeded, for general standards values 1.5 times the average operation results

## **NEW ACTIONS UNDERTAKEN BY THE AUTHORITY IN THE FIELD OF CONTINUITY OF SUPPLY**

The Authority is preparing a new scheme of data collection for assessing the continuity of supply that will replace the continuity standards of the actual Charter.

A new definition of urban, half-urban and rural areas is ready, still based on the list of "inhabited areas" from ISTAT:

- urban areas are the "inhabited areas" with more than 50000 inhabitants
- half-urban areas are the "inhabited areas" with less than 50000 inhabitants and more than 5000 inhabitants
- rural areas are the other "inhabited areas" including scattered houses

The character (urban, half-urban, rural) of the most populated "inhabited area" of each Municipality is assigned to all the areas of the Municipality.

In this way the number of urban and rural areas is reduced whilst the number of half-urban areas is enlarged, giving a more precise evaluation of urban areas (improved quality) and rural areas (decreased quality).

After the first application of the Charter to the continuity of supply indices, the Authority found that results among

different utilities were not comparable due to the lack of the same method to collect and process data.

For this reason the Authority is near to issue a new regulation concerning continuity of supply whose main items are the following.

Not only LV customers will be considered in the future but also MV customers. LV customers and MV customers will be considered in separate statistics to assess the different level of quality of supply delivered to these two groups of customers. Moreover for MV customers the individual level for each MV customer will be assessed.

Not only long accidental interruptions will be considered in the future but also short interruptions (>1 sec. and < 3 minutes). For the moment the transient interruptions (< 1 second) are not considered.

Three different causes of long accidental interruptions are considered:

- accidental interruptions: include both interruptions for which the faulted section is found and interruptions due to faults auto-restoring after a certain time for which the cause is not assessed
- third parties: interruptions caused by contact with lines from third parties or by faults inside the plants of the customers
- force majeure: these events are those for which the public authority has declared the status of natural calamity. ENEL does not agree with this restriction because, before arriving to declare the status of public calamity, there are other different stages that must be taken into account, such as the declaration of emergency by the public Authority and the alarm of rescue corps; in any case all exceptional weather conditions, for which the plants are not designed (for instance: strength of the wind, snow weight, etc.), should be taken into account

Five different stages are considered as origin of interruptions, with the aim of separating the responsibility of eventual different providers of the service, who operate in cascade: HV, HV/MV, MV, MV/LV, LV.

Among different systems provided by the report of the working group DISQUAL of UNIPEDE the authority has chosen the most suitable one, according to the principle of equal rights. For the LV customers the number and duration of interruptions has to be weighted according to the number of LV customers and not according to the number of MV/LV substations or to the number of MV/LV transformers, or according to the subscribed power of LV customers, or to the installed power of MV/LV transformers. The same holds true for MV customers: the number of MV customers has to taken as weight and not the subscribed power of these customers.

But even if the different utilities follow in principle the same scheme to gather and process data, experience shows that the results can be quite different, according to the accuracy of the process followed by each utility. Using, as source of data, the results of the SCADA system, automatically transferred into the information system charged of statistics of continuity of supply, the loss of

events is avoided, that is quite normal in manual or semiautomatic systems: the loss of events in a simple manual system, compared to a complete automatic system, can be around 50%, that is that the manual system gives the wrong result of a number of interruption reduced by 50%.

For this reason a certification is required that can be obtained either by means of internal quality systems or by means of external audits.

## **ECONOMICAL COMPENSATIONS TO MAINTAIN AND IMPROVE CONTINUITY OF SUPPLY**

The Authority is undergoing a complete renewal of tariffs for electrical supply. In this contest mechanisms like price cap are envisaged to relate the tariffs to external constraints, such as the price of fuels, and to the results achieved by the providers of the service in terms of quality of supply.

To evaluate an adequate compensation to the costs born by providers to maintain and improve quality of supply the following logical steps must be undertaken.

At first the indices to be used in tariff to compensate the cost of quality of supply must be chosen. The most important part of quality of supply being the continuity of supply, attention should be drawn on the number and duration of long accidental interruptions, that affect all customers. If, for the sake of simplicity, just one index has to be selected, the total duration of accidental long interruptions per year, that is the average minutes yearly lost per consumer due to accidental long interruptions, is proposed. As industrial and commercial customers are also concerned by short and transient interruptions, it could also be estimated the waste of production due to these kinds of interruptions and, instead of the total minutes yearly lost per consumer, the total yearly minutes of damage per consumer could be proposed. This index takes into account also short and transient accidental interruptions multiplied by the average conventional duration of production stop and, in case of long accidental interruptions, selects the maximum between the duration of the interruption and the duration of the production stop. Then the final amount of continuity of supply to be reached in a certain number of years (from 5 to 10 for example) must be defined, choosing a compromise value between the average present one and the theoretical value of zero, that in principle cannot ever be reached and that in any case should require an enormous deal of investments. Values of the order of magnitude about one half or one third of the present continuity values should be selected, to be realistic in terms of financial and almost human capacities to achieve the final objective in the given period from 5 to 10 years.

The third step is to evaluate, by means of suitable simulation models, the total amount of cost of the different suitable interventions on the network and almost the estimated improvements in quality of supply. To this aim the procedures [1] already presented at CIRED 1997 can

be used or, for a rough evaluation of costs and benefits, also a simplified model of the network to which apply the same principles, can be adopted. The correct setting of the compensation values should be based on these analyses of costs related to performances and not on arbitrary choices made by Authority itself or on the basis of market queries on the availability of clients to pay a certain amount of tariff to improve supply quality. The risk of approaches different from that of the technical simulation of interventions on the network is that they lead to compensation proposals very below the real cost of intervention so that no improvement will ever take place due to lack of economical convenience.

Finally, on the basis of these studies, the correct tariff compensation per each unit of quality improvement can be assessed. A decision must be taken if the economical compensation should be proportional to the present level of supply quality (if higher than the standard) or to the present improvement of the level (if the results of last year are better than those of two years ago) or to a combination of both present level and present improvement of the level. In the first case the present quality of supply level is rewarded (this is easy to understand by the customers), both costs to reach and maintain the quality level are included and the prize is rewarded every year. In the second case the improvement of quality of supply level is rewarded (this is not easy to understand by the customers), only the costs to reach the quality level are included and the prize is rewarded only in the year of the improvement.

## **CONCLUSIONS**

The Charter of Electricity Supply is one of the specific regulations external to the provider of the service that modify the relations between provider and client, enlarging the function of the public control system and pushing to a major attention to the expectations of the market.

That brings quality of supply and particularly continuity of service at the top of company strategies in a more determinant and structured way than in the past.

On the other hand quality policies are economically much more conditioned than in the past, as distribution systems are very close to the optimum solution in terms of planning and development, so that the improving costs become higher and higher and the effectiveness of interventions is rapidly decreasing.

That means that the provider of the service needs very complete and evolved tools of knowledge and analysis of his networks, of the service offered and of the market, in order to offer the maximum quality allowed by tariff mechanisms. trying to satisfy, with no additional burdens, the higher percentage of his customers.

## **REFERENCES**

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