

EMERGENCY OPERATIONAL PLAN (EOP) – CRISIS SITUATION MANAGEMENT

Miguel PULICE
 Edenor S.A. - Argentina
 mpulice@edenor.com

ABSTRACT

When events that produce the break of electricity service happen and affect to a significant number of customers or when the number of customers affected is not shown as significant but time restore of electricity supply is prolonged, Edenor (Empresa Distribuidora y Comercializadora Norte) has implemented an Emergency Operational Plan (EOP) to ensure, maintaining the conditions of public safety, energy service.

INTRODUCTION

Edenor (Argentina’s largest distributor of electricity utility) with 2,850,000 clients and a maximum power demand of 4941 MVA, in your concession area

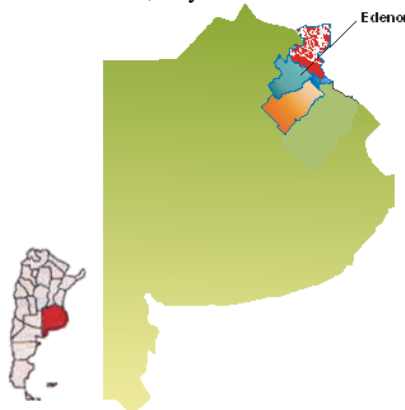


Figure N°1 Concession Area of Edenor

has adopted as a criteria for activation the EOP, the occurrence of any of the general conditions are set out in the following table.

Table 1 General Conditions Activation

Contingency		Estimated Restoration Time
Customers affected	> 100.000	> 2 hs
	< 100.000 y > 50.000	> 12 hs
	< 50.000 y > 20.000	> 24 hs
	< 20.000 y > 5.000	> 36 hs

Generally this situations respond to the increasingly frequent weather events caused by climate change that have been occurring in the recent decades with an even more accelerated rate. Given the probability of occurrence of circumstances that result in situations of the type described, the Pre Crisis plan is applied, in which the managers of each unit must ensure the availability of staff and resources of the company as well as staff and resources of their suppliers.

TYPE OF EVENTS

Climatological events can be divided broadly into three types and its combinations:

Winds > 120 km / h: Strong winds cause interruptions in aerial installations, although prepared to withstand winds of 120 km / h, are affected by trees collapsing with less intense winds, falling on the lines and knocking them. These also cause blasting of branches, sheet metal roof, and other foreign objects that end up causing short circuits and damages in the aerial lines.

On April 4, 2012 in Buenos Aires, there was a strong meteorological event that affected most of the towns of Buenos Aires and bordering, including the City of Buenos Aires.

According to reports from the National Meteorological Service, during the phenomenon at least 4 twisters were formed, two of them belong to the F2 category and the other two twisters of category F1 in the same scale with winds of up to 258 kilometers per hour. The most severe damage range extended to a length of 70 km with a width varying between 1500 and 2000 meters.

Due to the intensity, level of destruction and particularity of the phenomenon, it was the most destructive storm in the area that affected the Metropolitan Area of Buenos Aires and La Plata in its history, with the consequent impact (mainly aerial lines) of the electric power supply.

In an average of 20 minutes, it was enough to cause landslides, falling trees, blasting ceilings, road accidents and even vehicles dragged from their original places. A few hours later, the first reports of fatalities, injuries, evacuations, flooded areas and power outages began.

The first four days after the storm, only in the capital, 5.5 million branches and trunks of trees were removed. More than 1400 streets remained closed for days, some even for weeks, by obstruction with trees, poles or debris. A total of 79.760 trees fell or were destroyed.

Rains with a density of rainfall > 50 mm hour (for several hours): In recent times are occurring weather events with heavy rainfall in a short time, causing flooding due to the poor drainage of storm drains which affects mostly underground installations.

The rains also generate other problems, for instance streaks and insulators of MT porcelain are produced after high temperatures and on the other hand the dilated materials contract abruptly causing false contacts.

As an example of this type of climatic contingency we can mention the flood of Buenos Aires of 2013 that was a meteorological event that affected the northeast of the Province of Buenos Aires, mainly to the Capital Federal and La Plata city between April 1 and April 3 of 2013. Precipitation records marked a historic record for April, both in the Argentine capital, with more than 155 mm accumulated during midnight and 7:00 am April 2 as in the capital of Buenos Aires, where they dropped 392 mm during the whole day of April 2



Figure N°2 Precipitation accumulated in the localities of Buenos Aires: ■ More than 120 mm and important damages. ■ More than 120 mm ■ More than 60 mm ■ Less than 60 mm.

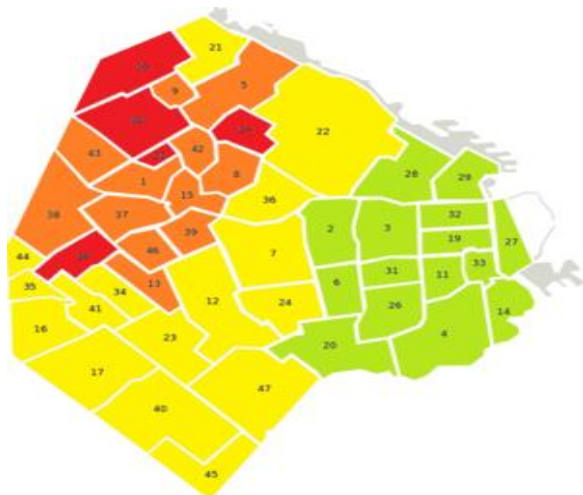


Figure N°3 Precipitation accumulated in Capital Federal: ■ More than 120 mm and important damages ■ More than 120 mm. ■ More than 60 mm ■ Less than 60 mm

In the Capital Federal, the electric service was affected by the great accumulation of rainwater, which affected for several hours at least eleven neighborhoods of Buenos Aires. In turn, the services of trains and the Buenos Aires subway were suspended as a result of the storm; The circulation of cars and buses was also affected, with some flooding to the accesses to the Capital and neighborhoods of Buenos Aires

Heat Wave: High temperatures maintained through time (Max > 35 ° for several days).

With high temperatures the electricity demand increase, by the effect of the growth of the quantity of air conditioning equipment. These temperatures do not allow dissipation of heat generated in cables and lines and increased current flow, increases the damage.

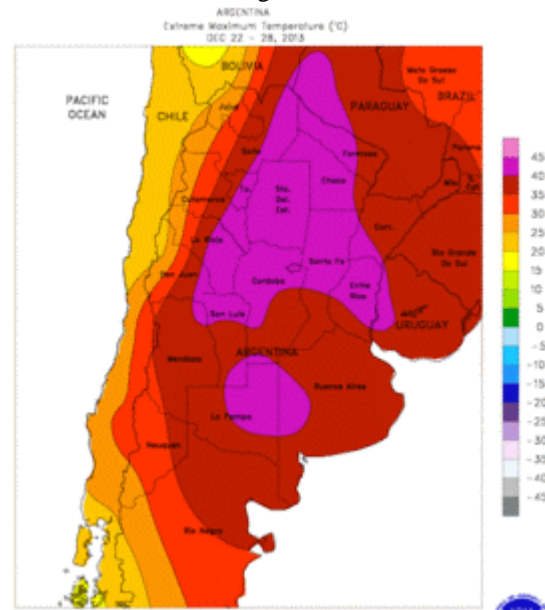


Figure N°4 Record of the heat wave temperatures - 22 to 28 December 2013.

As an example we can mention the heat wave in Argentina of December of 2013 that took place from the 11 of December of 2013 until the 2 of January of 2014 in the north and center of the country, as well as in the north of the Patagonia (south of the nation). It was the longest heat wave experienced in Argentina since records began in 1906 affecting at least 52 cities across the country. For the first time since the creation of the system of alarm by heat, it ran an alert in red level by several consecutive days. A heat wave is characterized by a marked and sustained increase in temperatures, especially the maximum ones, occurring in several cities, above what is considered, with

average minimum temperatures above 4 ° C and average maximums above 6 ° C Compared to normal for the time. The long persistence of this heat wave (22 days), made the event exceptional, breaking several marks for more consecutive days with temperatures above and below average.

On December 23, the Federal Planning Ministry reported that the Argentine Interconnection System broke the power demand record for one business day, at 14:20 when consumption reached its peak with 23,793 megawatts and likewise, on the 28th of December it was a record power demand for a Saturday, at 14:10 when a power consumption reached 21,264 megawatts.

EVOLUTION OF THE NUMBER OF CUSTOMERS AFFECTED BY METEOROLOGICAL EVENT

In the chart below, it can see the evolution of affected clients, where in the cases of twisters and floods, a peak of affection of the energy supply is observed in the first hours and its progressive decrease, whereas in the case of a heat wave the evolution is erratic because it depends on its intensity and permanence in time, observing in practice that to the customers who are restored to supply, are replaced by others new customers without energy, due to a new fault in another point of the electrical network.

Progressive normalization will be achieved when the speed of repair and normalization of energy supply exceeds the speed of the generation of failures, situation that is associated to an improvement in the climatic conditions

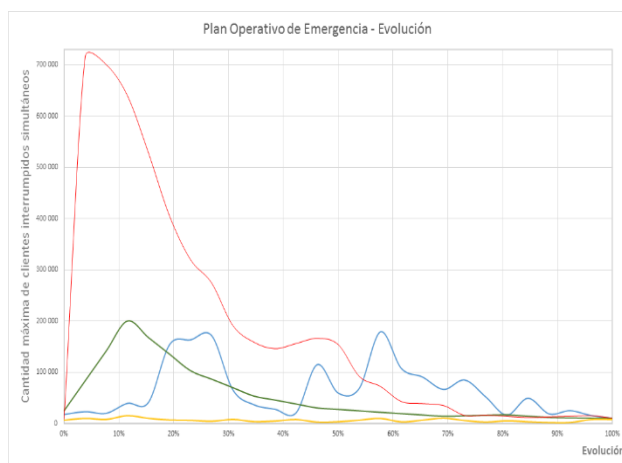


Figure N° 5 Characteristic graphic of quantity of effected customers in singular events in the city of Buenos Aires
 — Twister — Flood — Heat wave — Average normal day

IMPLEMENTATION OF THE EMERGENCY OPERATIONAL PLAN (EOP)

In all cases, it must proceed as follows:

A) Local emergency committee is constituted

The Director of Distribution, following the fulfillment of the provisions of the activation, proceeds to declare the implementation of the emergency operational plan by forming a centralized emergency committee and convening the local emergency committees. It in turn notifies the rest of the organization of the situation so that each Director makes available the resources that are required.

B) All scheduled tasks are suspended:

In order to have all the resources available

C) All affected staff are call up and the available and needed resources are verified:

In this instance from the declaration of Pre Crisis, the warning and availability of all the staff and contractors must be assured.

D) A review of roles is performed within the groups of belonging:

A brief review of the functions, work shifts, interactions, objectives and expected results of each group to conform

E) The predefined groups of works can be summarized in:

1) Information and situation status report

This group guarantees the quality of information and monitors the evolution of the situation by interacting with the local emergency committee

2) Review of installations and damage determination (Aerial networks for medium and low voltage. Only with hurricane winds and in the floods for underground installations)

This task will be performed by the teams defined in the Plan, which will be responsible (in case of twisters or floods) to relieve the anomalies of the Medium and Low Tension network. Each team must have an electrical scheme of the network, a communication equipment, the respective geographical plans. They will communicate the news to the Centralized medium voltage dispatch and the coordinator of their group.

3) Evaluation and assignment of repairs to be performed:

This group is responsible for managing (evaluate and assign) repairs to be made, depending on the available work teams, and the prioritization That must be made of them, according to potential risk to public safety,time of interruption of the electric service, number of customers

affected, Entities with benefits associated with public services (hospitals, health centers, fire and police stations, transport services, electrodependent clients, etc.). This group is in charge of Assistant Managers, department heads and supervisors.

4) Progress stage of field repairs

The company staff assigned to the task will be in charge of supervising the repairs, informing the progress to the group coordinator and delivering and receiving the facilities to be repaired

5) Monitoring and management damage claims

The assigned persons will manage the claims associated with the damages occurring in the situation of application of the emergency operational plan (EOP) and document the damages in order to inform the Regulator

6) Evaluation and dispatch of request of Municipalities and Government Agencies

This Group is in charge of attending to the specific complaints of government entities and informing them to the information management group for its evaluation and of corresponding its immediate derivation. If the Supply problem affecting the supply of drinking water, they will be responsible for coordinating their supply and distribution

7) Logistical support and external resources

Manage the resources requested by the operating areas having referents according to specialties in: Supply and Logistics, Telecommunications, Information Systems, Transportation, Security And Patrimonial Protection, Legal Affairs Department.

8) Support group of technical documentation

This is responsible for the printing and distribution of the schemes of the Media Tension network and the geographic plans requested by the Facilities and Damage Review group.

9) Communicational interaction with customers

Personal that if the need arises, contacts with unique clients affected by the event in question.

To do this, and depending on the magnitude of the meteorological phenomenon and the degree of affectation on the facilities, the groups are divided into two subgroups that complete twelve hours of work each, a situation that is maintained until the end of the Plan. When the service conditions can be controlled with the usual resources and diagrams, the Distribution Director will proceed to communicate such situation by deactivating the emergency operational plan (EOP).

As part of the process of continuous improvement in relation to the application of the EOP must be performed periodically:

a) Analysis and evaluation of the results obtained in previous EOP

b) Training and annual revision of the plan.

c) Preparation of the adequate and necessary resources to face contingencies, considering the availability of:

Electric generators, additional hydraulics trucks cranes, provision of fuel, drain pumps, tools, materials, potential external resources (suppliers) in addition to having the updated agenda with Fire Departments, Civil Defense, Municipalities, Police Stations, Neighborhood representatives and social organizations within each social party.

Special attention must be paid to the initial organization, since the response to an event of magnitude requires an analysis and organization prior to decision making, where the start of the contingency should be used for the evaluation and determination of the actions to be performed given That otherwise the reestablishment times can be significantly prolonged because the use of available resources (which are always limited) would not be optimal.

REFERENCES

[1] Servicio Meteorologico Nacional

[2] Norma NG3 Edenor