CASESTUDYSERIES

EXTREME WEATHER

Windstorms | France | December 1999

This case study is part of an extreme weather impact project, in partnership with Swiss RE Corporate Solutions and Marsh & McLennan Companies, which aims to identify and share best practice within the energy sector to enable more agile and adaptive response to extreme weather and natural hazard impacts on energy systems and supplies.

CASE STUDY AT GLANCE

WEATHER EVENT
Windstorms (Anatol, Lothar & Martin)

ORGANISATION
Électricité de France S.A. (EDF)

INDUSTRY SUB-SECTOR
Generation, Transmission & Distribution

RESILIENCE RESPONSE
Crisis management plan

RESILIENCE COSTS
€10bn (total, Europe); €6.9bn (France, from Lothar and Martin)

In December 1999 Europe was hit by three extreme windstorms, which in the most severely affected countries, reached a wind force of 12 on the Beaufort Wind Scale ("hurricane", i.e. over 118 km/h) and attained peak wind speeds locally of over 180 km/h. This windstorm series was opened on 3rd December 1999 by Anatol, which produced a record loss in Denmark of almost €2bn (total insured loss) – thus reaching a scale that many insurers had previously thought impossible. On 26th December 1999, Lothar, developed over the Atlantic off the northwest coast of France. Categorized as a meteorological "bomb" due to its almost explosive generation, the hurricane reached wind speeds of 120 km/h with several peaks at 200 km/h on the northern half of France and caused new and unexpected record losses. The French insurance industry had to pay claims totaling approx. €4.4bn. One day later, Martin, a second low-pressure vortex on the edge of a low-pressure system over the northern Atlantic, developed in a way very similar to Lothar. Martin followed a track somewhat further south and mainly hit southern France but also affected northern Spain and western parts of Switzerland. The French insurance industry again had to bear the brunt of the loss, €2.4bn of the €2.5bn recorded in Europe as a whole[1].

Due to the spontaneous general mobilization of top management and public authorities to understand the dimension of the crisis, energy impacts were limited. There was real involvement and a personal and collective commitment, both internally and externally from EDF. The sense of purpose and the public service have been real cultural fuels, which helped to restore electricity within a couple of weeks.

CONTEXT

ORGANISATIONAL PROFILE: EDF

- Operates a diverse portfolio of 120+ gigawatts of generation capacity in Europe, South America, North America, Asia, the Middle East and Africa.
- Operations include electricity generation (fossil fuels and renewables), T&D, power plant design, construction and dismantling, energy trading, and transport.

WINDSTORMS (ANATOL, LOTHAR & MARTIN), 1999

Three severe windstorms attained peak wind speeds of over 180 km/h. These storms were 1 in 100-year events.

ENERGY IMPACTS

Damages to both medium and low voltage grid infrastructure and major transmission line.

3.45 million customers were left without electricity on the 27th and 28th December (i.e. 12% of consumers); 5% of consumers still without power on December 30th.

Storms affected 79 of France's 95 departments and resulted in 92 casualties[2]. Significant damag- es occurred to the French forests and historical heritage. Total insured loss from the three storms exceeded €10bn.

[1] Munich Re, 2002 [2] Climate Change Post

METEOROLOGICAL CONSIDERATIONS

On 25th December 1999 a disturbance built up over the north-eastern Atlantic on a sharp air mass boundary between cold air in the north and warm air in the south belonging to a central low and developed into a series of intense low-pressure systems. Around noon, one of these systems, the secondary low named Lothar, had a central pressure of 995 hPa, which meant that it was still a rather inconspicuous bad weather front. The development of the low-pressure system was almost explosive, involving a large pressure drop within the space of a few hours[3]. By the evening of 26th December Lothar's centre had shifted eastwards to Poland. But then another secondary low, Martin, detached itself on the frontal zone over the North Atlantic similar to Lothar. Martin brought gale-force winds to the French regions of Bordeaux, Biarritz, and Toulouse, northern Spain, western parts of Switzerland, and Upper Italy. The insurance industry, particularly in France, was thus confronted with catastrophic windstorm losses from two events in less than 48 hours.

RESILIENCE: PREVENTION AND IMMEDIATE RESPONSE

EDF implemented several resilience measures prior to the windstorms. These include the establishment ofautonomous work bases, area-based management with dedicated teams, and central coordination. Furthermore, the boost in the autonomy of response effort was a significant factor, which limited the duration of adaptation and made possible the rapid attribution of repair areas to constituted teams. Due to the physical hardening implemented after local storm and wet snow events, the performance of the very high and high voltage transmission lines, particularly in the Paris region, was satisfactory. However, the state of the medium- and low voltage grid after the storms was scrutinized by the public, which suggested that physical hardening and new grid design is required.

Despite the fact that EDF had in place a disaster emergency plan along with periodic training of employees to manage crisis situations, the response to the windstorms was initially slow. This is due to the unexpected large magnitude of the events, their 'explosive' development and the absence of generalized crisis entry criteria. However, once operational, the crisis teams worked well and enriched the cohesion of the management thanks to daily teleconferencing.

Multistakeholder coordination was central to a timely response. The relationship with the local elected officials worked well, relying on existing technical means. The strong involvement of unit managers and agents limited the pressure on elected officials. Furthermore, coordination with external services such as fire brigades, gendarmerie, civil aviation, public services and administrations at local and national levels was highly efficient. In particular, the collaboration with the Army, the Red Cross and the Civil Protection was smooth and very effective in deploying response actions. Political forces helped at local and national levels, and supported EDF in the implementation of anticipation and crisis management measures when necessary.

Communication with large customers was also effective, with companies being individually contacted by EDF and monitored for diagnostics, needs, and feedback[4]. On the other hand, responses to individual domestic clients were often imprecise. This is particularly true regarding the communication of repair strategies and the expected date of power restoration in rural areas. The call centre was organized quickly and experienced limitations due to insufficient resources and imprecise information. However, communication with the media bodies was unanimously appreciated, due to its substance and the role played by local radio. However, the communication across national, regional and local bodies was chaotic and better targeting of national communication in times of crisis is required.

RESILIENCE: PREVENTION AND IMMEDIATE RESPONSE

Considerable resources were mobilized for recovery purposes including 35000 EDF employees (more than 1/5 of total workforce), volunteers (e.g. retired employees), and 20000 people including employees from other European utilities, fire brigades, gendarmerie, civil aviation, public services and administrations at local and national levels, and the Army. Technical resources such as stockpiling of repair equipment (e.g. wires, transformers, etc.) and generators were made available. However, dysfunctions occurred in the management of volunteers and skills. Unsuitable reinforcements were sent, and the lack of knowledge of the skills and occupations previously exercised by the volunteers limited mobilization effectiveness. Questions also remained about the need to maintain certain skills that were necessary during the crisis, which in turn would require forecasting skill management and outsourcing orientations. Restocking was also challenging despite the good will of suppliers, and the repartition of generators was executed chaotically particularly in terms of assignment and tracing. Following the extreme weather events, EDF conducted several levels of investigation and feedback gathering sessions, which included:

- Immediate dialogue with crisis management teams at business units and at national level;
- Auditing in business units, focusing on dialogue with all stakeholders as well as with the public authorities;
- A synthesis report developed 6 weeks after the events, which lead to suggestions for immediate action, and opened the preparation phase for decisions to be made within 3 months including on crisis management, preparedness, and organization.

[3] Effectiveness of disaster-related decision-making was demonstrated during past storm events. The Force d'Intervention Rapide Electricité (FIRE) deserves a special mention of efficiency even after the reorganization of the electricity sector due to the implementation of the new market design.
[4] Realized either directly or through professional federations and consular organizations, the follow-up of the contacts and the offer of services was well perceived.

ANTICIPATION OF FUTURE RISKS

The windstorm crisis revealed the importance of:

- having adequate inventory of events, even seemingly minor, could tip crisis situation;
- an initiative for supplementary biomass fuel storage and energy use;
- development of a scientific approach to forecasting meteorological phenomena and communication in this respect.

BARRIERS

Poor coordination, communication and functioning of some crisis cells at local, regional, national levels.

Poor reporting culture and tracing of decisions, actions

Insufficient knowledge of external interlocutors and institutions (directories not up to date; the attributions and the organization of the institutions poorly known)

Poor domestic customer communication

Poor procurement: low level of stocks and the delivery of unsuitable materials; lack of knowledge of appropriate logistics; the difficulties of restocking; unsuitable IT resources; the lack of knowledge of local companies

ENABLERS

Daily teleconferencing helped to increase the effectiveness of crisis cells

Presence of the management "package" including material and logistic support limited the duration of adaptation

Complete involvement of public authorities and government. Good coordination with external services including the army.

THE CRISIS REVEALED OUR "LITTLE FLAWS OF EVERYDAY LIFE" TO WHICH WE NORMALLY ADAPT BUT CAN BECOME DRAMATIC IN "ABNORMAL" TIMES. THESE ARE THE GREAT DISPARITY IN THE APTITUDE, PREPARATION ANDAVAILABILITY OF RESOURCES IN CRISIS, COUPLED WITH THE DIFFICULTY TO ACT EFFECTIVELY IN A FUZZY ENVIRONMENT

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