



## **‘MORE SUPPORT’ PROGRAMME FOR SAFE MAINTENANCE OF A POWER PLANT (COMMENDED CASE IN THE EUROPEAN CAMPAIGN ON SAFE MAINTENANCE 2010/2011)**

### **1. Case metadata**

#### **▪ Country/ies of origin:**

Italy

#### **▪ Year of publication by agency:**

2011

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55261D Maintenance worker

56081D Contractors

21321C Equipment

41681 B Hazards in plant, machinery and work equipment

20201D Safety policies and procedures

19961D Safety culture

47321C Work accidents

58761C Power stations

19321E Purchasing

### **2. Organisation involved**

Enel Produzione SpA, Energy Management and Generation Department

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### **3. Description of the case**

#### **3.1. Introduction**

Enel describes itself as Italy’s largest power company, and Europe’s second listed utility by installed capacity. Enel is an integrated player, active in the power and gas sectors. Enel today operates in 40 countries worldwide, has over 97,000 MW of net installed capacity and sells power and gas to more than 61 million customers.



Periodic maintenance of Enel plants is a vital factor in maintaining the efficiency and safety not only of systems and machines, but also of the working environment in general.

While maintenance has a key role to play, both in reducing losses and increasing the company's productivity, as well as ensuring safer and healthier working conditions, it also constitutes a high-risk activity in itself which demands preventive and systematic safety management involving the employer as contracting authority, the various contractors used for different tasks and all those responsible for the management and control of safety.

Increasing numbers of external staff, new and different risk situations, work carried out in limited space and time, and the risk of interference are all critical aspects arising during these activities. To prevent or reduce the impact of these factors, Enel has set up a safety management system bringing together all parties involved in the different stages of contracts, in which the planning, execution and control of work undertaken in compliance with co-ordinated and agreed safety procedures all contribute to risk prevention and mitigation.

The need to promote a structured approach to maintenance within Enel, and especially in the Generation and Energy Management (GEM) Division, grew out of an in-depth analysis of accidents and their underlying causes: in the two-year period 2007/2008, of the 69 accidents involving firms of contractors working in the thermoelectric generating plants of the GEM Division, 35% (24 events including 7 serious and 2 fatal accidents) occurred during the non-routine maintenance of equipment. With the above aims in mind, an example of "good practice" intended to promote an effective, programme-driven and structured approach to maintenance, based on preventive risk management, effective participation and involvement of the workforce and their representatives has been developed systematically since 2009 in Enel during plant shutdowns and maintenance; this project is known as "More support".

### **3.2. Aims**

- To analyse the increase of occupational risk levels with additional workers not belonging to the power plant personnel
- To analyse interferential risks
- To analyse new risk conditions different from the ones managed during the normal operations of the power plant
- To ensure safe extraordinary maintenance of Enel Electrical Energy production plants
- To ensure safety for activities carried out in limited spatial-temporal conditions

### **3.3. What was done, and how?**

#### **Background**

With the entry into force of Legislative Decree No 81/2008, Enel, and the GEM Division in particular, reviewed the system for qualifying companies, putting more emphasis on "on-the-job" checks and constantly monitoring the performance of its suppliers and contractors, using a rating system.

A serious and concrete approach to contractors was developed to improve contractors' safety performance by bringing them into line with Enel's own safety standards. The focus was on the vital aspects of safety in each stage of the tendering cycle - from qualification to the final award - by reinforcing the process of managing, checking and controlling their work and increasing its effectiveness.

The GEM Division has recently introduced an analytical system for the qualification phase, based on Pi (performance indices) and Qi (quality indices) which enable a further assessment to be made of contractors' reliability and quality in the field of safety. After allocating a score for the indices, using assessments based on the documentation supplied and taking account both of the contractor's track record in terms of accidents (INAIL premium rates) and of the investments it has made in health and

# CASE STUDIES

safety (training expenses, the purchase of personal protective equipment, studies and research, etc), if any shortcomings are detected, further investigation is carried out and a request may be made for corrective measures and improvements.

Once the contract has been awarded and before work starts, with a view to ensuring an appropriate level of cooperation and, above all, coordination between the awarding company and the contractors, further information is requested (on the risks arising from their activity, the response time by each contractor in the areas concerned, the preventive and protective measures taken, etc).

In the reception phase, to provide information directly to the staff of firms contracted to work in the company's plants, an appropriate briefing is given prior to the start of work covering the risks posed, the procedures for dealing with emergencies, and occupational health, safety and environmental management rules. Before staffs of external companies are allowed to enter the power plant, they are required to undertake this training and pass an individual test on the information learnt. Each person involved in the work is also given a Pocket Book containing a practical, summarised aide-memoire of basic rules of conduct.

During the work, the role of checking that the company's employees are operating safely and in accordance with the provisions of law and with Enel's own working procedures and instructions is a joint responsibility of the bodies responsible for occupational safety management (Prevention and Protection Department, plus the operational units monitoring the work of external contractors or supervising them - e.g. maintenance managers, section heads and operatives).

Finally, specific clauses included in contracts stipulate that penalties can be imposed and/or sanctions requested against members of the contractor's staff failing to comply with Enel's safety rules or with the provisions of law. In more serious cases, the awarding body may also terminate the contract.

In view of the above background, the "More support" project described below, through the objective and systematic collection of data on contractors' performance in terms of occupational safety, fulfils an important role in the prevention and reduction of risk factors arising during power station maintenance contracts.

## **The project 'More support'**

Through the "More support" initiative, the GEM Division is engaged in monitoring, checking, carrying out on-site training, raising awareness and promoting a culture of safety. The project, which openly involves contractors' staff, was launched during 2009. It entailed the establishment of a "More Support" team comprising Enel technicians with safety and maintenance expertise. The team is operating daily on a shift basis and assisting the staff of the power plant during major modifications and/or non-routine maintenance undertaken with the help of contractors. These processes involve numerous and complex logistical/organisational and management/planning challenges in the field of safety.

The company set out below the fundamental principles which made this initiative an example of best practice in the integrated and structured approach to safety in the business process:

- Building the team
- Interaction in work planning
- Coordination
- Support for on-site tests
- Reporting methods and further investigation
- Impact on contractors' rating

# CASE STUDIES

## Building the team

To make a preliminary assessment of the number of members required for the More Support Group, a formula is applied using an index-based method incorporating the following key elements:

- particular characteristics of the plant (power installed in MW, number of generators/generating sections, sector to which they belong);
- operating conditions in the plant (Enel staff numbers in the production unit, age of the plant);
- total volume of activity involving third parties (number of contracting firms, subcontractors, headcount of their staff involved, shifts worked);
- organisation and duration of non-routine maintenance work.

All the team members are maintenance experts and have undergone special training in occupational safety (minimum benchmark level of ASPP [company prevention and protection officer] as defined in Legislative Decree No 195/2003 / Training course for coordinators in work planning and implementation).



Fig.1 – The "More Support" team



Fig.2 –The daily briefing

## Azione di Maggior Supporto

### Flusso delle attività

Il GMS esegue giornalmente un **monitoraggio** sulle **attività** svolte dalle **imprese** impegnate nella manutenzione fondando il proprio lavoro sulla logica del ciclo Plan – Do – Check – Act



Settembre 2010

Maggior Supporto

7

Fig. 3 Flow chart of the 'More Support' initiative; source Enel

### Interaction in work planning

The company's guidelines and maintenance standards require the planning of technical and safety aspects of high-risk activities and of the non-routine maintenance of Enel plant to be carried out long before the actual work begins.

During the planning phase, an initial list of tasks is drawn up and gradually refined; eventually the final version is produced and used for the scheduling of activity. On this basis, an estimate will be supplied of the increased numbers of contractors' staff who will be working in the Division's plants, as compared to the average numbers present under normal operating conditions.

In order to take an active part in the preliminary phases of the work (meetings, allocation of areas, delivery of equipment) and to see the documentation relating to the planned non-routine maintenance work concerned (company safety plans, DUVRI [single interference risk assessment document], internal procedures in the unit, etc.) team members present themselves at the plant prior to the start of work.

The "More Support" initiative must be viewed as an addition to, not a replacement for the oversight, verification and control of contractors' personnel and equipment normally carried out by the responsible Enel staff in the plant. It is an organisational solution based on participation between the various persons within Enel and the firms involved in the non-routine maintenance of its plant. The ultimate aim is to share common strategic goals, cooperation and overall synergy on security matters.

### Coordination

The initiative discussed above and the people involved are presented at different times at specific meetings called to draw attention to its underlying principles:

# CASE STUDIES

- Enel's particular interest in avoiding accidents and creating safe workplaces, helped also by a significant contribution from its contractors and suppliers;
- the need for intervention to prevent accidents or potential risky situations, and to effect continuous improvements in the process of managing the health and safety of workers;
- the commitment to assess risks correctly and to take the appropriate safety measures;
- Enel's intention of increasing the safety and maximising the service level, professionalism, and quality of its contractors.



Fig.4 – Views taken during meetings with contractors

When presenting the project, the team coordinator explains the purpose of the initiative, the roles and responsibilities of the group, the procedures for carrying out checks, and the principal types of issues reported and safety shortcomings detected by the team in its work to date. The overall aim is to create awareness among the staffs of contractors and subcontractors of their own safety and that of others and of the constant need to act safely and follow procedures and measures designed to ensure safe working.

In particular, well in advance of the start of non-routine maintenance in power plants, the following meetings take place with the timing indicated:

- presentation of the team to the staff of the plant;
- presentation of the "More Support" initiative to contractors with the direct involvement of the respective employers, and the heads of prevention and protection departments;
- specific meetings with contractors, with the direct involvement of the staff representatives, works supervisors and workers.

Following the coordination described above, which covers the activities to be organised in conjunction with the plant's management and organisation structure, and which are to be carried out prior to the start of works, comes the daily "on-the-job coordination" between the team and the "key" personnel of the plant involved in non-routine maintenance (Head of Protection and Prevention, Head of Maintenance and Operations Section, and Management of the business unit).

Planning of the team's activities and the identification of areas where increased safeguards are required is carried out with the plant and is directly dependent upon the individual and specific characteristics of the work to be carried out.

## **Support for site tests**

The "More Support" group then checks, based on planning meetings held daily with the team coordinator (briefings), with the help of the contractors themselves, that the work is being carried out

# CASE STUDIES

properly and safely, by attending the workplace regularly and constantly, in order to ensure that the entire area of operations is monitored without fail during the course of the day.

As agreed with the coordinator during the daily meetings, the team carries out the following control activities, placing particular emphasis on:

- operational checks to ensure that work carried out by third parties is undertaken safely;
- checking the availability and use of collective protection systems;
- checking the adequacy of individual protection equipment supplied and ensuring it is being used properly;
- checking the safety characteristics of the working methods used by contractors in their own activity, and any departures from the work plans submitted;
- checking the storage of equipment in the dedicated areas in accordance with the instructions of the CMS and with the rules and regulations of the company;
- monitoring movements of equipment using any lifting gear and means of transport.



Fig.5 - On-site checks



Fig. 6 - On-site checks

## CASE STUDIES

It should be noted that the approach of the "More Support" group is highly communicative and seeks to raise awareness among contractors' staff with whom it comes into direct contact on-site when conducting its inspections. The main aims are as follows:

- to support cultural change to achieve increased safety in work commissioned from contractors, in accordance with the rules of conduct and provisions of law;
- to promote safe working practices by contractors in each phase of the work, calling for immediate remedial action when potentially risky situations are detected;
- to promote the use of personal protective equipment;
- to draw attention to specific risks in the various areas of work.

If the team's checks reveal faults and/or compliance failures giving rise to a situation of serious and imminent danger, it is permitted to intervene directly and immediately with the contractor's staff with a demand for remedial action.

The coordinator will immediately report the fault and/or compliance failure to persons in authority in the plant (Plant Manager and/or Head of Maintenance Section/Head of Operations and Head of Prevention and Protection) with a view to eliminating/reducing possible interference, optimising coordination of the location and timing of actions between the companies involved, and possibly issuing a formal warning to the contractor where circumstances dictate.

Faults and/or compliance failures identified during the week, the team's written assessments and the main areas of dissatisfaction are also analysed and discussed during the weekly works coordination meetings of the inter-company committee, organised and chaired at plant level. In the wake of reports of serious compliance failures, where applicable, the plant manager may issue a formal notice to the contractor and apply sanctions and penalties as stipulated in the contract.

### **Reporting methods and further investigation**

The group provides feedback and the results of checks on the safe execution of work commissioned from contractors by completing and signing following forms:

- Check register;
- Weekly report.

The "Check Register" is a questionnaire-type document used to check the contractor's operational team and completed by one member of the team during its daily activity.

The "Weekly Report" is a document produced by the coordinator once a week to be sent to the Plant Manager, Head of Maintenance Section, Head of Operations and Head of Prevention and Protection, showing for each contractor, based on the analysis of compliance failures, the outcome of the checks carried out and the overall assessment of its performance in terms of safety, a weekly assessment of the extent to which work has been carried out safely, using five performance levels: poor, inadequate, adequate, good, excellent.

# CASE STUDIES

| Componente GMS                                                   |                       |                                                                                                                     | Data                                                    | Inizio turno                                                    | Fine turno                                                       |                                                                         |
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|                                                                  | Personale in attività | Cartellino                                                                                                          | Adeguatezza vestiario                                   | Adeguatezza DPI                                                 | Corretto uso DPI                                                 | Contestazioni                                                           |
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| <b>Osservazioni</b>                                              |                       |                                                                                                                     |                                                         |                                                                 |                                                                  |                                                                         |
| Corretta segregazione area di lavoro                             |                       |                                                                                                                     | SI <input type="checkbox"/> NO <input type="checkbox"/> | nota                                                            | Integrità attrezzature di lavoro comprese quelle Enel            | SI <input type="checkbox"/> NO <input type="checkbox"/> nota            |
| Accesso sicuro impianto/area di lavoro                           |                       |                                                                                                                     | SI <input type="checkbox"/> NO <input type="checkbox"/> | nota                                                            | Adeguatezza attrezzature di lavoro                               | SI <input type="checkbox"/> NO <input type="checkbox"/> nota            |
| Ponteggi realizzati a norma                                      |                       |                                                                                                                     | SI <input type="checkbox"/> NO <input type="checkbox"/> | nota                                                            | Corretto uso mezzi movimentazione - sollevamento carichi         | SI <input type="checkbox"/> NO <input type="checkbox"/> nota            |
| Rispetto ove applicabile, procedura consegna/riconsegna ponteggi |                       |                                                                                                                     | SI <input type="checkbox"/> NO <input type="checkbox"/> | nota                                                            | Attività nel rispetto normativa vigente e disposizioni aziendali | SI <input checked="" type="checkbox"/> NO <input type="checkbox"/> nota |
| Note - Container collegato alla rete di terra.                   |                       |                                                                                                                     |                                                         |                                                                 |                                                                  |                                                                         |

Fig.7 - Check register

| Valutazione del comportamento in tema di Safety                                  |          |           |               |       |            |   |              |
|----------------------------------------------------------------------------------|----------|-----------|---------------|-------|------------|---|--------------|
|                                                                                  | t.n.     | 1         | 2             | 3     | 4          | 5 | Osservazioni |
| Metodi e organizzazione del lavoro                                               |          |           |               |       |            |   |              |
| Dispositivi di protezione                                                        |          |           |               |       |            |   |              |
| Macchinari e sistemi                                                             |          |           |               |       |            |   |              |
| Rispetto disposizioni aziendali                                                  |          |           |               |       |            |   |              |
| Legenda: 1 Negativo; 2 Insufficiente; 3 Sufficiente/adeq; 4 Buono; 5 Eccellente; |          |           |               |       |            |   |              |
| VALUTAZIONE FINALE                                                               | Negativa | Insuffic. | Suff/adequata | Buona | Eccellente |   |              |
|                                                                                  | (1)      | (2)       | (3)           | (4)   | (5)        |   |              |

Fig.8 –Weekly report

## Impact on contractors' rating

Aspects of the group's analysis and observations in its reports are useful and contribute to the rating of contractors' performance in safety terms which, in turn, may have an impact on the future qualification of each contractor.

For contractors and suppliers with which it has contractual relations, Enel has devised a system of Vendor Rating. This is an objective and systematic information-gathering procedure covering companies' performance during the supply process, as well as aspects related to the punctuality, precision and safety of services provided, and any shortcomings/compliance failures in the goods supplied.

## CASE STUDIES

The process of assessing contractors and suppliers concludes with the allocation of an overall Vendor Rating Index (VRI) to each qualified supplier, based on four sub-indices reflecting the key categories (punctuality, quality, precision and safety in the supply process), with scores awarded of between 0 and 100.

The Vendor Rating Index based on the above observations, is used by Enel to arrive at an overall assessment of each supplier in relation to the various types of services and/or goods supplied, which will help to develop useful benchmarks for future supply strategies or for intervention with suppliers already qualified.

### **3.4. *What was achieved?***

The results of the first phase of implementation of the project were highly positive. Between June 2009 and 23 August 2010, with over 1,000,000 hours worked and 89,790 checks carried out on a total of 365 companies observed and a maximum of some 4,000 external workers engaged in scheduled maintenance on 16 thermoelectric plants in the GEM Division in Italy, the only injuries suffered have had a prognosis of fewer than 30 days.

There has been a significant reduction in the number of accidents and in their severity. With the "More Support" initiative, accidents occurring during non-routine maintenance of thermoelectric plants in the GEM Division have seen a clear reduction:

- 24 accidents (of which 7 serious and 2 fatal) in the two years 2007-2008,
- 10 accidents (0 serious, 0 fatal) in the 2 years 2009-2010 (1.349.735 working hours for outage),
- 0 accidents in the first half year of 2011 (76.588 working hours for outage).

Figure 10 shows the faults and compliance failures most frequently identified during the safety checks on contractor firms. The main areas of criticism are failure to use personal protection equipment, blockage of escape routes and inadequate cleaning and segregation of areas made available, as well as misuse of equipment.

# CASE STUDIES

**1,020,412** hours worked

**4021** contractors' employees

**365** firms studied

**1243** weekly safety assessment reports

**89,788** checks

**5303** formal notices issued

**259** interruptions to work

**3288** immediate corrections

**1969** remedial actions (during shifts, later)

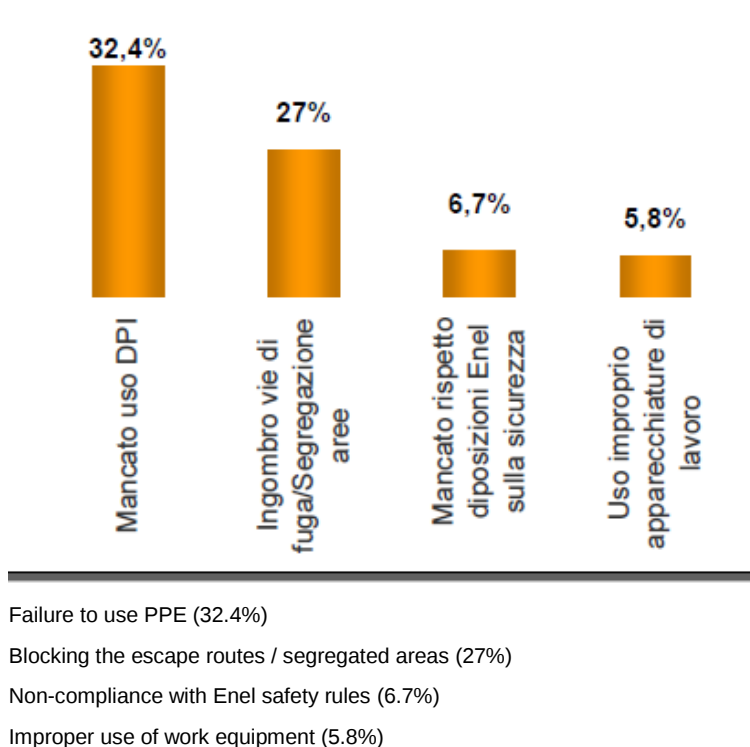


Fig. 9 - "More Support" in figures

Fig. 10 - Compliance failures by type

This initiative has also been highly popular with contractors, being viewed as a useful contribution to safe working and as on-the-job training helping to disseminate a safety culture through concrete advice and suggestions. This is confirmed by the reduction over time in the numbers of contractors' safety compliance failures and risk situations recorded by the team in all the site reviews in plants in which the action has been carried out. Throughout the period of this initiative, contractors have cooperated actively with the team, also offering concrete suggestions to improve maintenance. The unions have also been kept informed and involved in the "More Support" initiative, and have welcomed the new procedures introduced by the company, in furtherance of its determination to reinforce its commitment to the broader achievement of the objective of "zero accidents".

An "Additional Support" guideline for a safe extraordinary maintenance of the assigned power plants together with suppliers' cooperation was established.

Check, controls, training on job, safety policy is what Enel Energy Management and Generation Department realized thanks to the "Additional Support" Project.

It involves suppliers' personnel in order to sensitize it about its own and other's safety, about the need of behaving safely and adopting right procedures and actions in every moment. Thus the project supported the cultural change about a safe fulfilment of the jobs assigned to suppliers under provisions of the law and according to behavioural standards.

## Extending the project

In 2011 several initiatives have been carried out in order to extend the project:

- Start up the internationalization of the project: Best practice has been extended to some other countries belonging to the Enel Group. In particular, a pilot application is planned in some Spanish power plants belonging to Endesa

## CASE STUDIES

- Creation of a behavioural model for Enel Production Power Plants: The “Additional Support” project has become a model to be followed for safety planning and managing of every outages in Enel Production Power Plants.
- “Safe outage” handbook: A handbook describing in detail all the steps to be followed for safety planning and managing of extraordinary maintenance in Enel Production Power Plants has been realized and delivered to Employers and Employees belonging both to Enel and to Suppliers, to everybody involved in power plant maintenance. This handbook is provided with a video report presenting the “Additional Support” Project applied for extraordinary maintenance of Unit 3 in “Federico II” Enel Power Plant in Brindisi. An English version of the handbook is being prepared.

### **3.5. Success factors**

- Determination of the Enel management and the high participation and interest by the suppliers.
- Constant reduction of danger factors and risk levels arising during the extraordinary maintenance of Enel power plants
- Worker sensitisation and the diffusion of a safety policy through trainings on job

### **3.6. Further information**

Website of Enel Produzione SpA: <http://www.enel.com>

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### **3.7. Transferability**

The approach can be transferred to similar companies; this will be assisted by the English version of the handbook.

## **4. References, resources:**