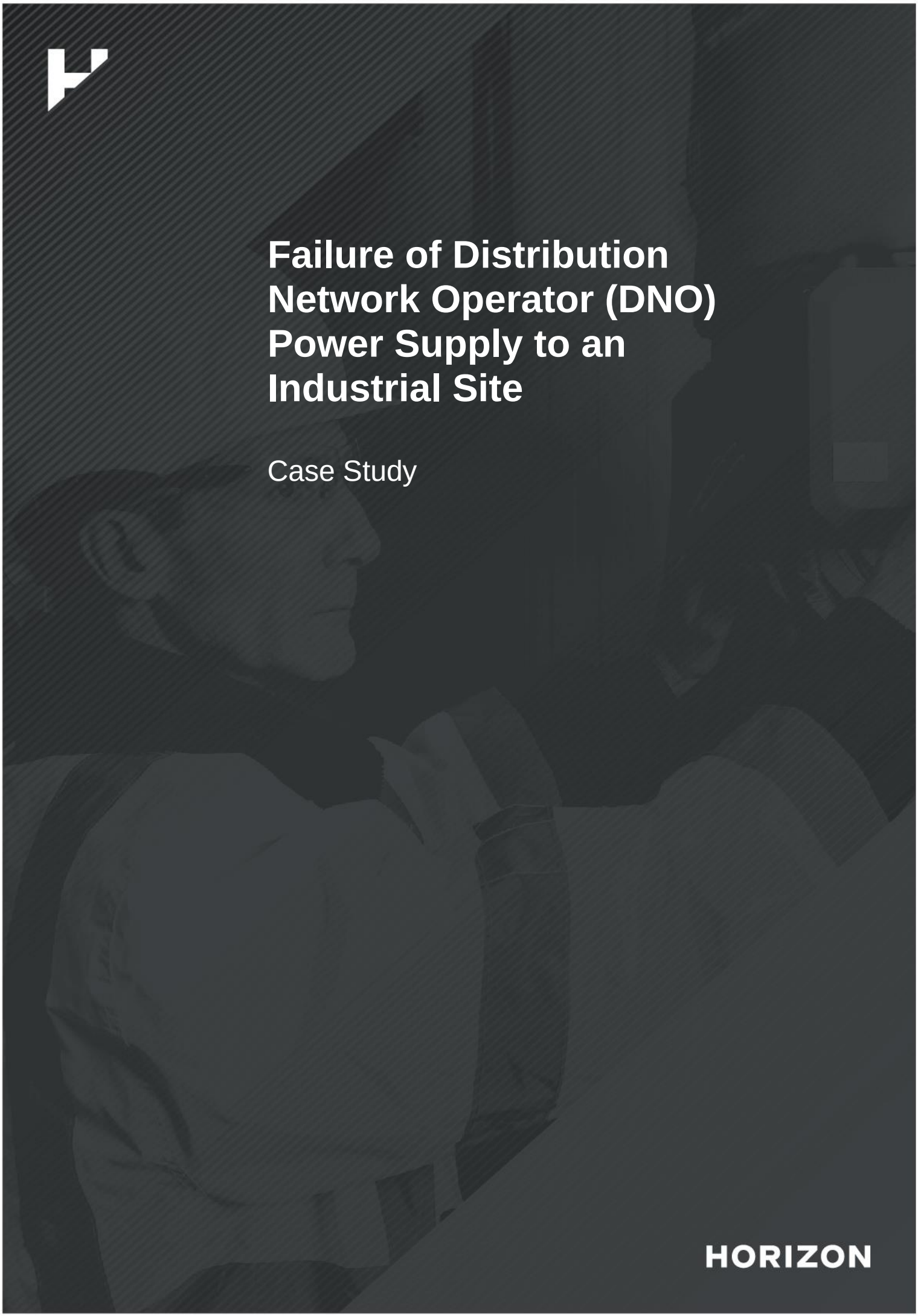
Failure of Distribution Network Operator (DNO) Power Supply to an Industrial Site

Case Study



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Any enquiry about the purpose or content of this document should be referred to:

Managing Director
Horizon Engineering Solutions Ltd
Unit 11
Ravenhill Business Park
Ravenhill Road
Belfast, BT6 8AW

t. +44 (0)7850 507 116
e. mburrows@horizonengineering.co.uk

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Section 1
Introduction

Major incidents involving the failure of the incoming Distribution Network Operator (DNO) HV or LV power supply to industrial sites are thankfully a rare occurrence. However, when they do occur it is important to have a well-developed procedure in place which addresses the steps to be taken from first report through to restoration of supply and which also supports any Client Business Continuity Recovery Plans.

The nature of the DNO outage and particular site conditions will affect how each incident is dealt with.

The following general guidance is based on an industrial facility which operates over a number of geographically remote sites and is supported by non-resident client appointed specialist electrical contractors.

It is important to note that any procedure developed for a particular site must consider incidents which occur during and outside of Normal Working Hours.

Section 2
Communications

During an incident it is essential that information is received, issued and recorded in a timely and concise manner to ensure that all personnel involved in the incident are kept fully informed at all times. This also includes all communications with the DNO Control Centre.

To achieve this, the following is recommended:

1. Establish a centrally manned control or reporting facility to:

a. Receive all fault notifications
b. Issue and receive progress updates
c. Provide regular updates to management
d. Liaise with the DNO Control Centre

2. Ensure that the contact number for this facility has been communicated to all relevant parties at each site, i.e. Security, Engineering and Production Management, Health and Safety Dept etc.

3. Have in place documentation which records the details of the incident from initial report through to restoration of supply. The information which should be recorded as a minimum is:
    e. The place or site where the incident has occurred
    f. Date and time the incident was reported
    g. Details of the person reporting the incident
    h. Brief description of what has happened:
        i. Temporary loss of power
        ii. Sustained loss of power
        iii. Repeated loss of power
        iv. Power fluctuations
    i. Dates and Times Notifications and Contacts were made
    j. Date and Time competent persons arrived on site
    k. Dates and times reports were received from competent persons on site including brief description of report
    l. Details, dates and times of all communications with the DNO Control Centre
    m. Details, dates and times of all updates issued or received
    n. Date and time power restored to the site

Section 3
Notification and Contacts

Having recorded the initial details of the incident it is now essential that this information is communicated as soon as possible to the personnel who will be dealing with the incident. This should include:

1. On site Emergency Response team (usually Security)
2. Operational Site Lead or Duty Site Lead
3. Site or Duty Electrical Competent Person
4. Site or Duty HV/LV Authorised Person
5. Contractor Management
6. Client Management
7. DNO Control Centre

How information is communicated will be dictated by existing site emergency response protocols. It is therefore essential that these protocols are written down.

Section 4
Mobilisation

When dealing with an incident on a remote site time will elapse before engineering competent personnel arrive on site. During this mobilisation time the On-Site Emergency Response Team should start to implement the Site Emergency Protocols especially in regard to the evacuation of personnel and contacts with the Emergency Services if required.

When the Engineering Competent personnel arrive on site they should:

1. Report to the Emergency Response Team and ascertain the current situation to determine if it is safe to proceed with an investigation. This assessment should include the condition of any Life Safety Systems such as the Fire Detection and Alarm System.

2. Notify the control or reporting facility that they are on site and give them a report on the current situation and advise them what their next steps will be.

Section 5
Site Investigation

After it has been determined that it is safe to approach the intake switch room the competent personnel should carry out the following safety checks and inspections**:**

External (Pre-entry) Checklist

1. Typically, these checks should be looking for the presence of any abnormal conditions, sounds or smells external to the intake switchroom.
2. If any abnormal conditions are observed or detected **Do Not** enter the intake switchroom.
3. Report the findings to the Site Emergency Response Team and the control or reporting facility and await further instructions from management.
4. If no abnormal conditions are observed or detected proceed with the internal safety survey of the intake switchroom.

Internal (Entry) Checklist

1. Typically, these checks should be looking for the presence of any abnormal conditions, sounds or smells within the intake switchroom.
2. If any abnormal conditions are observed or detected **Leave** the intake switchroom immediately and secure the door.
3. Report the findings to the Site Emergency Response Team and the control or reporting facility and await further instructions from management.
4. If no abnormal conditions are observed or detected proceed with the switchgear and equipment inspections

Switchgear and Equipment Inspections

Depending on the intake supply arrangements with the DNO, i.e. Shared Switchroom, it may be possible to visually check

the operational status of the DNO switchgear and protection systems.

Under no circumstances should anyone try to operate or interfere with any DNO switchgear or equipment.
It is essential that all inspections are carried out in a safe, systematic and controlled manner in accordance with standing inspection checklists and that the findings of these inspections are recorded on the checklist and in the Substation Logbook. It is also important that the persons carrying out the checks and inspections are not distracted by having to answer telephone calls from people wanting to know what is happening!
Typically, these visual inspections should include:

1. Operational status of all HV Switchgear, i.e. Open, Tripped, or Closed.
2. Status of all protection relays.
3. Status and condition of any Battery Tripping Units.
4. Activation of any inter-tripping arrangements between DNO owned switchgear and Client owned switchgear.

On completion of the visual inspections the Site Emergency Response Team and the control or reporting facility should be informed of the findings.

If any abnormal conditions are found no further actions should be taken until more experienced specialist staff attend site.

Section 6
Site Restoration

Site restoration should only take place after the following conditions has been met:

1. No abnormal conditions have been found on the Client's electrical system
2. All circuit breakers are in their normal operating position
3. All protection relays are indicating normal healthy conditions
4. All Battery Tripping Units are indicating normal healthy conditions
5. The DNO Control Centre has confirmed that the cause of the outage on their system has been rectified and that it is now safe to restore power to the site

Restoring power is very much dependant on site specifics. However, as a general guide the following checks and actions should be carried out as part of the restoration process:

1. Resetting of all undervoltage trips

2. Resetting and starting of all utilities plant and equipment such as Boilers, Compressors, Pumps, Ventilation and Air Conditioning Plant

3. Resetting and starting of natural gas equipment

4. Verifying that all supplies to the following have been re-instated:
    a. Internal and external lighting systems
    b. Life Safety systems
    c. IT Equipment
    d. Production Equipment
    e. General Purpose Power systems

5. Verifying that all UPS systems have returned to their normal operational state

6. Verifying that all Standby Generators which may have started under mains failure conditions have stopped and returned to their normal operational state

7. Resetting of all G59 control relays fitted to Generators or PV systems

8. Resetting and restarting the above Generators or PV systems and verifying that they are generating normally

Horizon Engineering Solutions Ltd
Unit 11 Ravenhill Business Park
Ravenhill Road
Belfast BT6 8AW
t. +44 (0)28 9099 6040
e. info@horizonengineering.co.uk

horizonengineering.co.uk

HORIZON