

POWER FAILURE INVESTIGATION

Expertise and experience to turn the worst-case scenario into best practice

Blackouts and power failures can have profound and widespread consequences for you and your customers.

Ensuring a safe and reliable energy supply is the number one priority for power system operators. As systems become more connected, the potential impact of an outage grows. Meanwhile, factors such as ageing infrastructure and the growth of renewable and distributed energy sources increase the risk of failures. Understanding the root cause of adverse events is the first and inevitable step to prevent reoccurrence.

Our power failure investigation (PFI) service offers comprehensive, impartial analysis with unmatched quality, using our structured approach to accurately identify the root cause of failure. DNV has a unique combination of deep expertise in both power system components as well as power systems. We perform hundreds of power failure investigations each year around the globe, enabling us to grow our

continuously evolving knowledge to provide you with results that are of the highest quality, reliability, and useability to help prevent future outages, improve your processes, increase asset safety and reliability, win or avoid legal claims and rebuild trust.

Our extensive experience covers all components of any power grid, such as transformers, switchgear, power cables and accessories, overhead lines, power electronic drives, HVDC systems, motors and generators, batteries, insulators, transmission towers, surge arrestors, capacitor banks, rotating machines and secondary equipment – as well as complete power systems. This includes wind- and solar-power specific components and systems, all voltage classes – both AC and DC, land or submarine and the IT, communication and cyber security aspects of systems and incidents.



In-depth, independent analysis

Our investigative approach is characterized by three distinct stages.

1. **We collect as much relevant information about the failure as possible.** This extends from equipment design and production quality to testing and installation. And in the case of a power failure during operation we also involve related secondary equipment, network behaviour, maintenance, operation activities and the environment. We can also include extensive power system design, loading, stability, protection, harmonics, and transient studies, a review of the quality assurance process and quality control documentation, SCADA and protection system read-outs, a site visit, interviews with persons involved, and of course a detailed dismantling of the failed components including a broad collection of relevant measurements and tests. In practice, not all this information may be available, in which case we will work to obtain the most critically important details and conduct our investigation based on the information which is obtainable.
2. **The facts are used to formulate hypotheses for the root cause of failure.** This often involves extensive analysis, evaluations and brainstorming, bringing together DNV's unique multidisciplinary in-house expertise, including electrical, chemical, mechanical, thermal experts as well as experts on the power system level and IT/cyber security if relevant. We also invite relevant experts from the parties concerned to provide specific information or expertise, while adhering to the guidelines of DNV's fully independent investigation. This all ensures nothing is missed and guarantees uniform and complete results. Further specific material analysis, mechanical and electrical tests, simulations and inspections may be used to verify the hypotheses, depending on the situation.
3. **We translate the results of the investigation into recommendations based on your chosen areas of failure mitigation, from design to operation.** The recommendations help you mitigate the impact of the failure and are crucial for controlling the risk of recurrence. DNV has extensive expertise available to help you also in that process, and/or to review actions of other parties doing so.

The results – including analysis approach, findings and recommendations – are delivered in a high-quality report and/or presentation with clear root cause and effect visualization methodologies.

Need urgent help with a blackout, power failure or other incident?

Call our 24/7 hotline or email us today:
Global +31 26 356 2727, pfi@dnv.com



Supporting you remotely

Blackouts and failures of power equipment continue to occur, even when travel is hampered (e.g. due to a pandemic or other issues). If necessary, many of our PFI-related activities can also be performed remotely and activities in our laboratories can be witnessed remotely by our customers. As we have offices and employees all around the world, remote field inspections with (secured) live video streaming are also possible, using local representatives on-site and remote experts giving real-time instructions and guidance. This still enables high level investigations, even in such situations.

WHY CHOOSE DNV?

Multidisciplinary approach

DNV has a unique set of world-class experts in all disciplines (electrical, mechanical, chemical, thermal), on all grid components and on all power system level aspects. This has on numerous occasions proven to be crucial for finding the actual root cause of a failure or outage.

World leading facilities

Investigation can be carried out at your site, or in our industry leading laboratories which include mechanical, material and microscopy laboratories and our specially dedicated power failure investigation laboratory. Your representatives can be present in our labs or witness the activities remotely using a secured high-quality video stream.

Worldwide experience

DNV performs hundreds of failure investigations each year all around the world. This combined experience has proven to be essential in getting and maintaining sufficient knowledge on all specific failure modes and system behaviours, which are continuously evolving.

Global reach, local service

With over 100 offices worldwide, we can respond rapidly to any request and be on-site for an initial visit as soon as possible. You can also take out a 24/7 service agreement to guarantee an investigator is available to be on-site within hours of you reporting a failure.

Trusted impartiality

A failure investigation by DNV is fully impartial and confidential. This often proves to be crucial for finding the actual root cause of a failure, especially when the stakes are high or when lawsuits are involved or could become applicable. We also provide legal support services such as expert witnessing in courts to help resolve disputes and/or settle liability claims.