nationalgrid

Commercial Engineering Services

High Voltage Engineering Specialists

A unique combination of experience and expertise

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High Voltage Engineering Specialists

A unique combination of experience and expertise

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As the owner and operator of the high voltage (HV) electricity transmission network in England and Wales, National Grid has substantial experience and technical expertise in the provision of safe, reliable, high quality engineering services.

Since 1990, we have been providing these HV engineering services to external customers including Power Generators, Interconnectors, Transmission Owners and Distribution Network Operators (DNOs).

We are dedicated to providing excellent customer service and high quality work alongside our commitment to deliver safely, reliably and efficiently. All services are delivered through our own highly experienced maintenance and support teams, giving us full control over all these parameters.

The supply of these services to customers is organised through the **Commercial Engineering Services (CES)** team, which is based at National Grid's UK headquarters in Warwick. CES looks after the customer interface and provides a full account management service, which includes contract set up and management, work planning, delivery overview and invoicing.

The CES team liaises very closely with colleagues in the Operations and Operational Support teams to ensure smooth delivery of services to customers throughout the UK, Ireland and, depending on the service, further afield.

Customers and Services Overview

Value adding propositions for established and evolving markets

02

We provide high voltage engineering services to a wide range of customers, with a focus on safety, quality and customer service. At the forefront of innovation, we develop and offer solutions that add value to customers, with an emphasis on enhanced environmental performance.

CES offers an extensive range of well-established services to a diverse customer base. In addition, we are continuously improving and developing our offer to satisfy the evolving requirements of our customers and the changing market landscape in which we operate. National Grid is at the forefront of innovation, thanks to the extensive expertise of our employees, which provides the solid foundation for our performance as transmission owner and operator. The CES team strives to continually expand the services and support we can offer to customers by capitalising on this innovation and expertise to develop and deliver unique propositions.

Customers

Power Generators
High voltage substation and connection assets from the generator transformer to the National Grid connection point.

Onshore Transmission Networks

Offshore Transmission Networks
- Asset care onshore
- Network services

Distribution Networks
132kV assets at Grid Supply Point substations and overhead lines.

HV DC Interconnectors

Services

High Voltage Maintenance Services
- 24-hour emergency call-out
- Site routine inspections
- Outage maintenance
- Safety switching
- Safety management

Oil Services
- testing and analysis
- replacement
- reconditioning
- reclamation

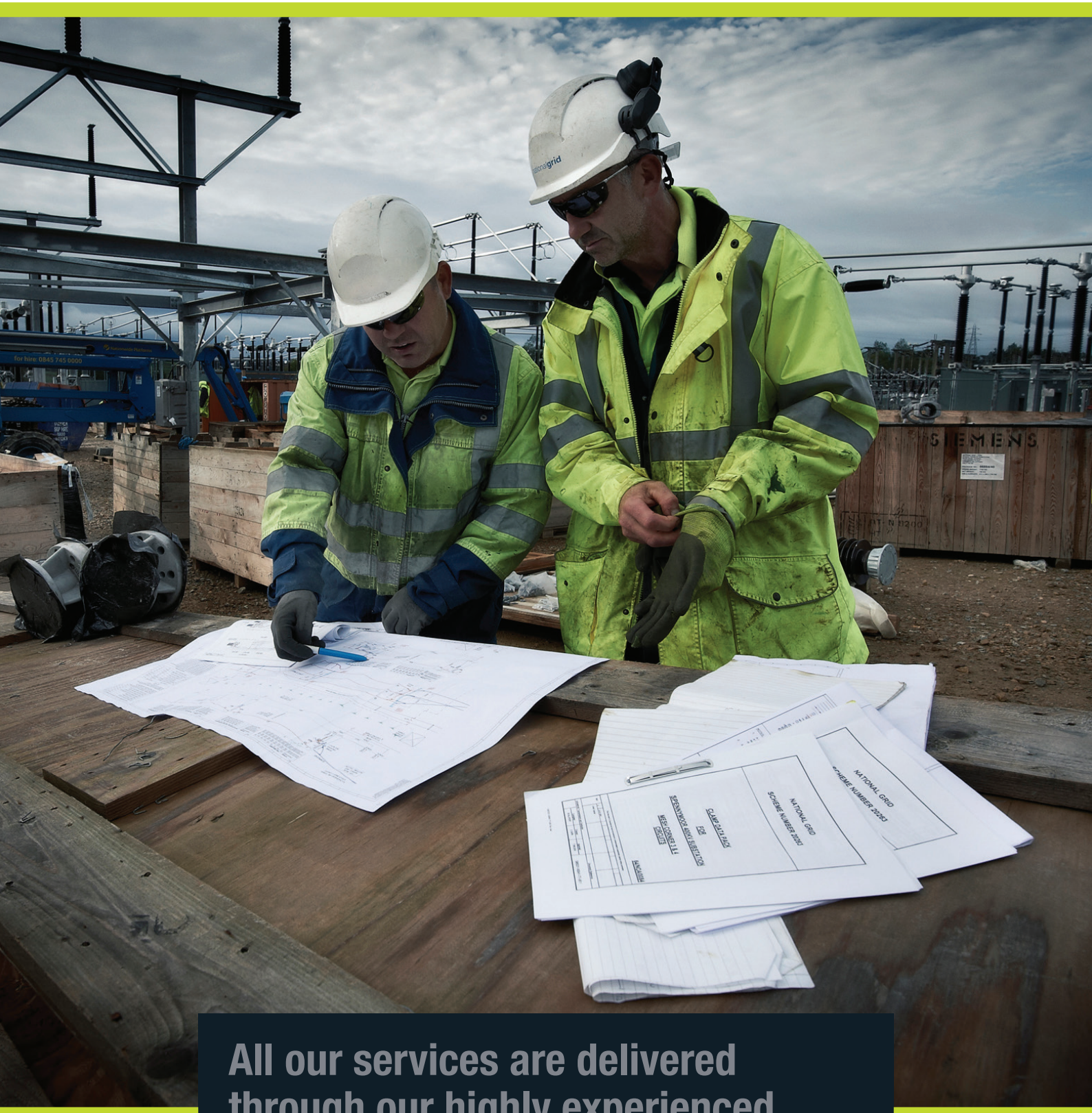
High Voltage Spares and Cable
- Access to National Grid's HV strategic spares inventory
- Membership of the 132kV and 33kV oil-filled cable clubs

Overhead Line Services
- Cable route and overhead line inspection and condition monitoring (helicopter and/or foot-patrols)
- Access to sky cradles and temporary towers

Engineering Documentation
- Access to the 'Technical Standards' document suite via our extranet
- Access to our exclusive transmission tower drawing library and associated expertise.

Specialist Consultancy Services
Including:
- Electro magnetic frequency (EMF) assessments
- Rise of earth assessments
- DC power transfer and conversion

If you have a requirement or opportunity that you wish to discuss, even if not listed here, our team are on hand to assist with your enquiry.



All our services are delivered through our highly experienced maintenance and support teams.

High Voltage Maintenance Services

Available nationwide, via experienced, highly trained operatives

03 We provide a full range of high voltage maintenance services, from routine site inspections and outage maintenance to our highly valued 24-hour emergency call-out service.

24-Hour Emergency Call Out
This service is a 24-hour, 365 day a year emergency call-out, providing access to appropriately authorised and trained National Grid Electricity Transmission personnel to respond to and evaluate faults or incidents on plant and equipment. A set annual fee is payable for the provision of this emergency service.

First Line Support is provided either remotely or by deployment of a stand-by person to the site. The service includes:

- Fault / incident evaluation by telephone
- Or attendance at the relevant site and provision of site-based fault or incident evaluation on the plant and equipment
- A report on any work carried out

Second Line Support, as and when required, is a follow-on to first line support and is subject to resource availability. Where safe and possible to do so, we will work to rectify faults or incidents.

Both first line support and second line support are charged in accordance with time and material rates.

Site Routine Inspections
We offer routine, non-invasive, non-outage inspections of plant, equipment and site infrastructure providing the customer with a detailed report on the condition of their HV assets.

These inspections give peace of mind that plant and equipment are being regularly monitored in line with either National Grid's own best practice procedures or to the customer's own requirements. This service is provided under a set annual fee.

Any defects found are either rectified at the time, if practical to do so, or included in planned work programmes.

Outage Maintenance
Outage maintenance work on HV plant and equipment includes the planning, execution and reporting of results, and it is carried out during notified outage periods. National Grid's Electricity Transmission team has significant technical competence and expertise, which enables high quality work to be carried out to world-class safety standards.

Outage maintenance is dependent upon the customer giving a pre-determined minimum notice period for agreed work windows and a defined work scope. We will then allocate resources for delivery of the work in agreed timescales. Outage maintenance work is charged based on an agreed schedule of rates.

Safety Switching
Appropriately authorised and trained National Grid Electricity Transmission personnel can provide an ad-hoc and pre-planned switching service on plant and equipment under National Grid Safety Rules.

This service is charged at a fee per request, plus the associated time and material rates for the utilisation of staff.

Safety Management
Through National Grid's Transmission Network Control Centre (TNCC) we are able to provide a range of safety management services in accordance with National Grid Safety Rules. These services include:

- Control transfer of third party assets from Control Person Operations (CPO) to TNCC Control Person Safety (CPS)
- Establishment and control of safety precautions (isolation and earthing)
- Issue, cancellation and control of safety documents including permits to/for work, sanction to/for work etc.
- Management of safety co-ordination across control boundaries to the requirements of Grid Code OC8
- Return of control of the 3rd party equipment to the 3rd party CPO following the cancellation of the final safety document and removal of all safety precautions.

Safety Management is charged on an annual basis, with a one-off set-up fee. The set-up fee includes:

- Preliminary advice and assessment of requirements
- Agreeing and defining control boundaries for plant and equipment
- Designing and building the necessary screens in line with the Integrated Energy Management System
- Provision of on-site training for customer employees in all areas of the required processes.

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E.ON

CIRCUIT BREAKER REPLACEMENT

National Grid was approached by E.ON to undertake a circuit breaker replacement at Ratcliffe-on-Soar Power Station. This involved the local National Grid delivery team planning and delivering the project from start to finish, managing all safety and co-ordination issues, and delivering to a challenging programme. During the project, a good working relationship was established and maintained with the customer, which ensured the work progressed well and was successfully completed on time and to budget without any issues.

Reflecting on the success of the project, Richard Montgomery, E.ON's Project Manager said **"I would just like to take this opportunity to thank the Ratcliffe team for successfully delivering the outage works you have undertaken for us, including the replacement of the circuit breaker, all planned routines and the repair of the isolator."**

Oil Management Services

A full range of services from testing to reclamation

04 Using the very latest mobile technology, our Oil Management Unit (OMU) operates from three strategic locations – Dartford, Leicester and Doncaster.

Our vehicles have high speed mobile degasser dryer units that pull vacuum, dry, filter and remove gases from oil. We also have mobile reclamation units that re-generate oil. They dry, filter, remove gases and chemically treat the oil to remove acidity and sludge.

As a result, we can provide a full range of oil management services to customers from sampling, testing, analysis and advice, to replacement, reconditioning and reclamation. Some of these are detailed here:

- **Transformer Top Up Oil** – is sold in units of 2000 litres with a 12 hour emergency and 24 hour response.
- **Transformer Bushing Oil** – is dried and degassed to an exacting standard of under 5ppm moisture and supplied to sites, in 5 litre sealed flasks, with a six month shelf life. These can be sent to your site by courier for next day delivery if ordered by midday.
- **Oil Circuit Breaker Service** – we remove dirty oil from the asset during maintenance which is either stored on site or taken to our facilities for processing. On completion of the maintenance work, reconditioned oil is then used to refill the circuit breaker.
- **Transformer Diverter Oil Service** – we have a bespoke oil handling kit for diverter maintenance, consisting of two portable 2000 litre bunded tanks with associated pipework and flanges. Dirty switchgear oil is drained into the empty tank. The second tank contains 2000 litres of switchgear oil, reconditioned to agreed standards, which is used for refilling.
- **Transformer Selector Oil Service** – we have a bespoke oil handling kit for selector maintenance, which consists of a 6000 litre portable tank with associated pipework and flanges. This allows the selector compartment to be gravity drained ready for maintenance. After the maintenance work is completed, the oil is returned to the selector compartment via one of our OMU oil processing units, to ensure the oil meets agreed standards.

Our fleet of OMU vehicles are equipped with a market leading range of cutting-edge equipment.

- **Topping up Transformers using a ground level connection** – uniquely, our OMU is able to top up most transformers from ground level using bespoke equipment that contains dried and degassed new oil, saving time, cost and eliminating safety hazards associated with working at height.

- **On site high speed Transformer Oil Drying and Degassing Service** – we use our mobile drying and degassing units to recondition the oil back to the required standards. Testing of the oil is undertaken to confirm oil quality and to ensure unnecessary processing is avoided and quality of oil is achieved.

- **Transformer Major Oil Change Service** – we connect the transformer to one of our OMU dry air machines. It is then drained, flushed and vacuumed, as per the manufacturer's instructions, and refilled via our mobile processing unit.

- **The Addition of Inhibitor/Passivator to a Transformer Service** – we add passivator and inhibitor concentrates to the transformer, to the customer's required specifications.

- **Transformer Oil Reclamation** - is undertaken using a mobile high speed reclamation unit. Oil reclamation is a process which eliminates, by physical and chemical absorbent means, the contaminants and products of oil deterioration. Concentrated inhibitor is usually added at the end of the process to restore the oxidation resistance lost during its service life, unless the customer specifies otherwise.

High Voltage Spares and Cable

Emergency access to strategic stocks

05 The National Grid stores facility contains extensive stocks of strategic spares and cable. Many of these spares are no longer supported or produced by the original equipment manufacturers, or they are subject to long lead times from the suppliers.

We are able to give customers emergency access to our National Grid stock of spares and cable on a 24-hour, 365 day a year basis in return for an annual fee. This negates the need for customers to finance and maintain their own stocks.

Spares

We keep a comprehensive range of high voltage components including transformers, tap changers, cable, switchgear, protection and overhead line spares.

Our instant access service and UK-wide fast delivery, means that you can get your equipment repaired and running again in the shortest possible time, minimising downtime and protecting your valuable revenue stream.

Cable

We manage emergency strategic stock of 132kV and 33kV oil-filled cables and cable accessories on behalf of Distribution Network Operators (DNOs) and other Transmission Owners (TOs) as well as for our own use. We finance stock acquisition, source alternative supplies of cable and provide technical support to all Club members. The club is seen as a valuable national strategic resource which avoids the need for individual customers to hold their own stocks.

The service can be taken separately for spares or cable, or as a combined spares and cable access arrangement. It is charged on the basis of an annual fee for access to the spares and/or cable, plus a charge for any items issued.

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CENTRAL NETWORKS

AN EMERGENCY SPARES REQUEST

An emergency enquiry was received from Central Networks for a cable modification kit. Following prompt liaison with our spares strategy engineer and our National Stores, the required item was identified and delivered to site on the same day. Ian Evans, Project Manager for Central Networks, said **“Thanks for the prompt service again from both CES and the National Stores.”**

All our helicopters are fitted with the latest gyro stabilised video, thermal imagery and digital recording media.

Overhead Line Services

A range of solutions tailored to customer needs

06 Our Overhead Lines team is able to provide a number of services from routine inspections via foot patrols to thermal imaging and condition assessments via helicopter.

The specialist Helicopter Unit is staffed by experienced pilots, observers and camera operators. All of our aircraft are fitted with the latest gyro stabilised video, thermal imaging and digital recording media.

Our specialist team carries out detailed line surveys for our customers, to check for faults and damage resulting from high winds and adverse weather conditions.

Work can be undertaken to the customers own frequencies or, where possible, alongside National Grid's own routine inspections, resulting in a cost-effective service.

Data collected during line surveys is collated into professional survey reports, enabling engineers to evaluate faults and effect remedial action. The team can also carry out live line repairs where necessary, substantially reducing outage durations.

Specialist Equipment Hire

We can also provide hire of sky cradles and temporary towers. Sky cradle mobile conductor 'bridges' are ideal for working on major road or motorway overhead line crossings as an alternative to costly scaffolding. Temporary towers can be used in projects such as temporary overhead line diversions.

Engineering Documentation

A wealth of technical information available online

07 Throughout National Grid's long history in electricity transmission, we have built up extensive expertise and experience, along with a vast array of technical information.

Extranet

Our extranet service provides customers with a license to access the National Grid Electricity Transmission (NGET) 'Technical Standards' document suite, which contains hundreds of documents, including Technical Specifications, Technical Guidance Notes and Transmission Procedures. These documents are made available via the NGET extranet website after payment of an annual fee.

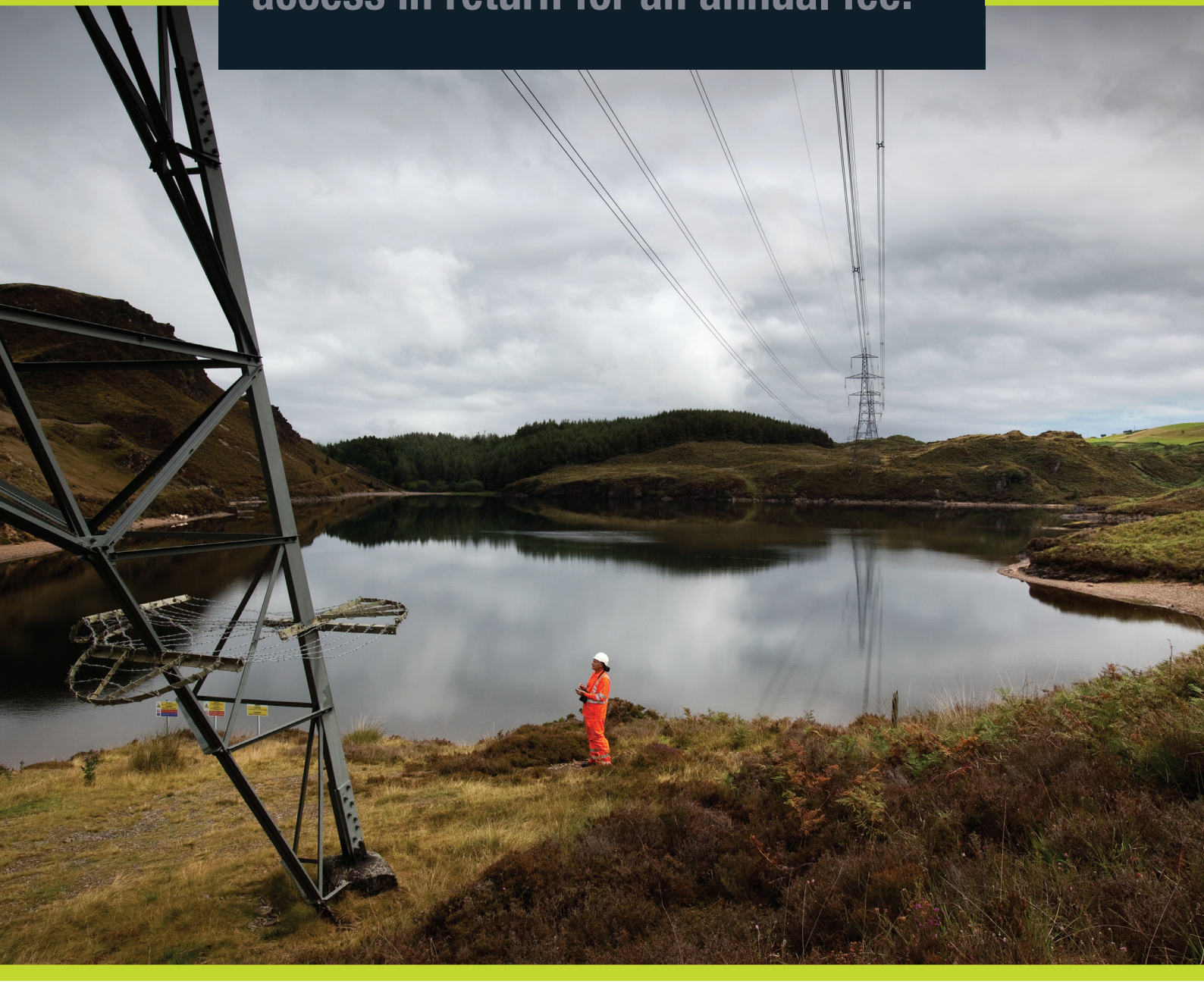
Tower Library Services

We offer a library service of overhead line tower drawings, which provides:

- Shared storage
- Retrieval and use
- Document management

The tower library contains around 85,000 drawings for overhead line towers from 66kV up to 400kV. This service provides access to up to 250 drawings for an annual fee, although more drawings can be accessed for a further charge.

We maintain an extensive and expanding suite of technical documents, which customers can access in return for an annual fee.



Specialist Consultancy Services

Engineering expertise from our team of specialists

08 We are able to provide engineering consultancy services in a number of areas including Electro Magnetic Frequency (EMF) and Rise of Earth testing.

Our specialist EMF team can carry out assessment work on the magnetic fields of plant and equipment on behalf of our customers and report on these results.

The Rise of Earth testing includes determining the earth return current for a given customers required location. We will then produce a report and assessment of these results.

We have also gained considerable expertise in DC power transfer and conversion through our interconnector work. As renewable energy sources and interconnection between networks expand, advice on the operation and maintenance of these HVDC links is a key service we can offer.

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EDF Energy NG LTD

OIL MANAGEMENT SERVICES

During a planned outage of Generator 8 at the Heysham 2 Power Station, CES organised for a National Grid mobile, high-tech oil processing unit to carry out services on site. Generator transformer 8 was refilled and the oil processed to the correct quality standard. Unit transformers 8C and 8D were flushed, drained, refilled and the new oil processed to the correct quality standard.

The customer found the Oil Management Unit (OMU) service and equipment to be excellent, our staff to be very helpful and accommodating, and the 24 hour operation of the OMU machinery to be very beneficial, because it reduced the time taken for the operation.

Peter Starkie (Contract Manager), for EDF added,
"OMU staff worked in conjunction with station and other contractors to achieve the planned results. The staff attending site understood the scope and their interaction within a challenging programme to achieve the end result."

Douglas Barker (Responsible Engineer), for EDF added,
"We have now had 3 transformers refilled by the OMU working in conjunction with Shell and a further 2 transformers reprocessed. The quality of the flushing has been exceptional leading to better than expected results and benefits from the refills. The attention to detail, experience, environmental awareness and attitude of the OMU staff, while working on our nuclear site, has been exactly what we expect."

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