

**Hydro operation and maintenance support**

Our hydro services team can provide a comprehensive range of operational and maintenance support services throughout the lifespan of the plant. Specialist testing techniques can be applied periodically whilst the plant is in operation and also during plant outages, to ensure optimum plant reliability and availability. These include:

- inspection services
- specialist high voltage testing (generator, transformers, switch gear, cables etc.)
- specialist protection and excitation systems testing and certification
- condition assessments
- vibration analysis and plant diagnostics
- environmental and water quality support.

Our extensive experience of plant condition assessment is coupled with operation and design knowledge to deliver high value engineering reports. These not only provide commentary on the plant condition but also advise on operational implications, pointing to future maintenance requirements and outage work scopes.

**Hydro consultancy and design services**

We can provide a comprehensive range of consultancy and design services. These include:

- hydro mechanical design
- computer aided drafting
- 3D modelling
- stress analysis including Finite element stress analysis
- hydraulic/system modelling
- failure mode analysis
- site surveys
- feasibility studies
- owner's engineer services
- computational fluid dynamics
- welding and materials consultancy
- laboratory support
- generator specification and design consultancy
- electrical and mechanical protection and excitation systems design
- electrical infrastructure, earthing studies
- control and instrumentation systems design
- DCS and SCADA and associated network communications infrastructure.

**Hydro service solutions**

Whether you have issues with reliability, availability, or environmental compliance – or if you need help with your medium or long term strategy – we will use our experience and expertise alongside yours, to find the best way forward.

As part of the RWE Group, we can call on the capabilities and resources of one of the world's leading multi-utility companies. We combine international reach with local understanding to provide innovative solutions that enhance the performance and profitability of your assets.

As well as our workshop and outage expertise, we also have access to a wide range of hydro consultancy and design facilities across the RWE Group.



3D modelling



## Hydro services

Improving plant efficiency, reliability and flexibility



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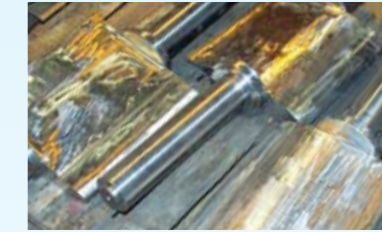
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RWE Power International is a competitive provider of services in the development and support of hydro electric power generation. RWE's experienced hydro engineers are able to offer a full range of services to other hydro power generating companies, offering benefits such as improving efficiency, reliability and flexibility.



Refurbished Kaplan Unit at Kielder



Replacement guide vanes

We have extensive operations and engineering knowledge together with practical experience as an asset owner, operator and developer. Many of our engineers come from a hydro-generator manufacturing background bringing design, build and commissioning experience for entire hydro electric schemes.

RWE's operational portfolio of hydro sites from across Wales, Scotland and England are remotely controlled from Dolgarrog Power Station by means of advanced satellite technology. Our engineers can draw on a century of hydro operations and maintenance experience in a variety of commercial markets.

We can help you maximise returns on generation by optimising plant performance. We provide leading edge technical support backed by the expertise of the entire RWE Group.

RWE Power International is a collaboration between two companies within the RWE Group, RWE Npower plc and RWE Power's consulting subsidiary, RE GmbH. With clients in more than 70 countries around the world, our expertise spans the full range of electricity generation technologies especially in renewable energy.

We offer engineering support, specialist operations services and consultancy advice to clients operating in many different market sectors.

**Overhaul, refurbishment and replanting of hydro power plant**  
RWE Power International's hydro services provide a comprehensive hydro refurbishment service via our engineering workshops and offices at Ferrybridge, Yorkshire and Glasgow, Scotland.

Our engineers are specialists in evaluating and upgrading generation plant to prolong asset life, reduce planned and unplanned outage times and improve performance. We can devise and implement strategies that deliver enhanced asset value.

#### Turbine refurbishment

Our hydro services team have undertaken refurbishment and replanting projects on many different types of hydro turbines, including Francis, Kaplan and Reversible Pump.

The following is a summary of the different refurbishment projects we have completed on hydro turbines.

- grease-free modification to guide vanes
- regulating ring modifications
- cover repairs (including on-site machining)
- repairs to draft tubes and spiral casings
- bearing repairs
- shaft seal re-designs
- guide vane seal re-designs
- runner and guide vane replacement
- site machining of penstock flanges
- wear ring replacements
- shaft repairs
- gearbox repairs
- Kaplan blade replacements
- turbine re-alignments
- control and instrumentation modifications.

#### Valve and gate refurbishments

We are one of the UK's leaders in the refurbishment of all types of large bore valves. We have undertaken refurbishment on some of the largest hydro valves in the UK. All hydro valves repaired at our workshops are supported by in-house technical expertise and site support teams. We are also able to offer a gate refurbishment service. The following is a summary of the hydro valve and gate projects we have recently completed.

- rotary type main inlet valve refurbishment
- butterfly valve refurbishment
- relief valve refurbishment
- bypass valve repairs
- spillway gate refurbishment
- intake screen repairs
- control valve repairs and re-design
- valve seal and bearing re-design
- draft tube gate repairs
- gate operating gear repairs
- manufacture of strategic spares
- stop log repairs
- design and supply of penstock blanks
- workshop assembly and pressure testing
- gate valve refurbishment.

#### Electrical, Control and Instrumentation refurbishment

We have extensive experience in the refurbishment of electrical infrastructure and control and instrumentation systems on a wide range of hydro plant, including the specification preparation and design of new equipment. We can also oversee equipment installation as well as undertaking full test and commissioning services for:

- generators
- electrical and mechanical protection systems
- excitation systems
- HV switch-gear
- transformers
- control and SCADA systems including the remote control of plant
- plant instrumentation and turbine supervisory systems
- remote condition monitoring systems
- governors.



Low Head Francis Unit at Dolgarrog



New Pelton Unit at River E