

MAXIMISING YOUR
Offshore wind assets

ASSET OPERATION & MAINTENANCE SERVICES



res
power for good

RES is one of the world's **leading renewable energy companies** active in the wind, wave, tidal, solar and biomass sectors



THE QUEEN'S AWARDS
FOR ENTERPRISE
INTERNATIONAL TRADE
2013

Asset Management

Maintenance Campaigns

Advisory Services

Met Mast O&M





In-house Engineering Expertise



We can integrate as part of the client's team

RES OFFSHORE

Our dedicated team of over 200 experts located across the UK, Europe and USA can help optimise your wind farm assets. We have the full range of in-house capabilities required for complete wind farm **asset management**, management of **maintenance campaigns**, specialist **advisory services** and **met mast O&M**.

Our offshore operational experience and in depth technical and engineering understanding makes us an excellent partner for delivering your O&M services.

Our wealth of in-house technical, engineering, construction and asset operation and maintenance expertise has been gained from over 30 years in the renewables industry and we deliver services to clients across all phases of projects. We have participated in all UK rounds and in projects across Europe and North America with a client list including Centrica, DONG Energy, SMart Wind, Forewind and Iberdrola.

Our **asset operation** and **maintenance services** can **maximise** your offshore wind assets

20 years **experience**
managing our own
wind farms gives us
unrivalled expertise

Complete integrated service
from turbine to shore

Stakeholder management

Data analysis & management

Operational optimisation





Photo: SMart Wind



Providing Specialist Personnel & Vessels



Replacing and Calibrating Equipment

ASSET MANAGEMENT

RES has over 20 years' experience of wind farm operation and maintenance, managing a portfolio of over 1300MW of onshore operating projects worldwide.

This broad experience, together with our specialist offshore environmental and engineering capabilities, provides a sound basis for the management of offshore wind and marine energy projects.

Maximising the energy yield of an offshore project whilst minimising costs presents a whole new range of challenges for project owners. It requires the integration of the full range of commercial, technical, engineering, environmental and project management skills. We can provide an integrated management service which will optimise reliability, availability and energy yield for wind, tidal stream and wave energy projects.

SERVICES INCLUDE:

Operation and maintenance strategy development and performance optimisation

Operational health, safety and environmental management and monitoring

Operational phase environmental survey management

Performance and production reporting and optimisation

Reliability monitoring and down-time evaluation

Condition monitoring and maintenance planning

Equipment failure investigations

Grid code compliance monitoring

Stakeholder relations and data management

Contractor selection and management

We **optimise** the **safe** and **efficient** operation of wind farms for our clients

From complete scheduled **maintenance campaigns** to specific issues across **balance of plant** or **turbines**, we can meet your requirements

End of warranty inspections

Blade inspection & repair

Gearbox oil sampling & change

Structural material assessment & repair

Subsea inspections

Environmental monitoring

Independent verification

Statutory safety inspections

Client representation





Balance of Plant Inspections



Turbine Maintenance

MAINTENANCE CAMPAIGNS

RES Offshore can plan and execute your maintenance campaigns. We perform all types of activities from minor everyday tasks such as ID light change out, to complex bespoke engineering solutions such as a wind farm-wide monopile grouted connection repair. **Whether scheduled upkeep or an immediate requirement, whatever the task, we have the expertise.**

Our services include, but are not limited to:

| BALANCE OF PLANT |
|--|
| Transition piece condition assessment and remedial works |
| Independent verification inspections |
| Subsea inspections, including cabling |
| Materials, welding and corrosion, cathodic protection |
| Environmental surveys and monitoring |
| Statutory safety inspections |

| TURBINE MAINTENANCE |
|--|
| Independent verification inspections |
| Handover and end of warranty inspections |
| Gearbox oil change |
| Blade inspection and repair |
| Blade bearing change |
| Statutory safety inspections |
| Gearbox and transformer oil sampling |

We provide both **strategy** and **implementation** for your maintenance campaigns

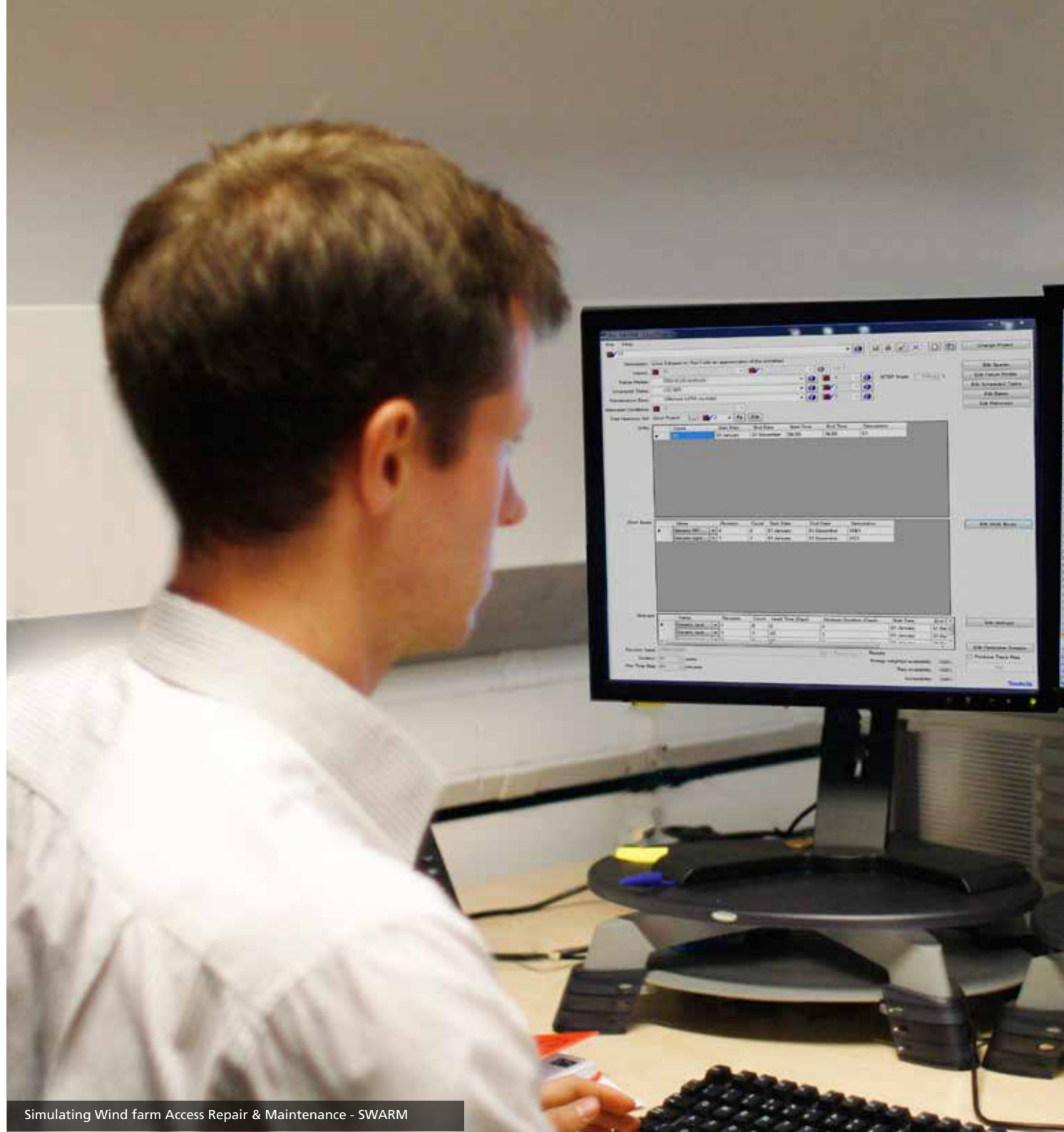
We provide **specialist advice** for all areas of offshore wind farm **maintenance**

Engineering expertise

Management systems skills

In-house O&M operations modelling

Commercial support



Simulating Wind farm Access Repair & Maintenance - SWARM



Health & Safety Exercise



Engineering Solutions

ADVISORY SERVICES

ENGINEERING SOLUTIONS

Structural analysis,
bespoke technical solutions

Cables, electrical systems

Reliability engineering

Condition monitoring

Root cause analysis

Data management and analysis

ESTABLISH FRAMEWORK

Set-up of O&M operations

Developing systems:
e.g. response flowcharts in case
of faults

Health & Safety:
e.g. creation and review
of emergency response
preparedness plans (including
developing and running training
exercises)

COMMERCIAL SUPPORT

Supplier review & procurement

Due Diligence

Insurance inspections and
maintenance:
e.g. turbine warranty claims

IN-HOUSE MAINTENANCE OPERATIONS MODELLING

Using a variety of tools, including SWARM (Simulating Wind farm Access Repair & Maintenance) our in-house time-step model software, we can help identify the optimum O&M strategy for a wind farm. The tool uses real weather data, vessel operating characteristics, failure modes and probabilities to assess the overall O&M cost, including lost generation.

Established in offshore wind since the beginning;
we offer our **specialist expertise**

Whether you require **full asset management** or **specific project support**, your met mast is in expert hands

Site acceptance and testing

Provision of specialist personnel and vessels

Data monitoring and analysis

Equipment replacement and calibration

Structural integrity checks





Experience of Round 3 Met Mast Maintenance



Provision of Specialist Personnel

MET MAST OPERATION & MAINTENANCE

We offer a specialist O&M service to met mast owners, taking on the overall management responsibility to ensure consistent high quality data.

Depending on our clients' needs, we use our in-house expertise to undertake planning, technical, engineering, management and supervision. We use carefully selected partners to provide vessels and trained technicians.

We have experience of maintaining Round 2 met masts **and were the first company with experience of Round 3 met mast operation and maintenance far offshore.**

We have the capability to provide a full Engineering, Procurement, Commissioning and Installation (EPCI) offshore met mast package.

We manage the logistical and safety challenges of weather and sea conditions, isolation and working at height to provide:

| |
|---|
| Client representation during onshore site acceptance testing and offshore installation |
| Provision of vessels and personnel suitable for the site and tasks |
| Change out and re-calibration of instrumentation |
| Periodic structural integrity and bolt torque checks |
| Unplanned maintenance activities, such as fault finding, re-design and upgrades as required |
| Monitoring and analysis of data from the met mast |
| Balance of plant maintenance – removal of corrosive material, cleansing solar panels, subsea operations |



Managing the **technical** and **logistical** challenges where **safety** is paramount



RES Offshore provide technical and operational expertise for developers and owners of offshore wind farm assets

Contact us now to discuss how we can help you:

RES Offshore
Faraday House
Station Road
Kings Langley
Herts WD4 8LH
UK

Tel: +44 (0)1923 608 200
Fax: +44 (0)1923 299 299

Email: info@res-offshore.com

www.res-offshore.com



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RES Group | v2 | 0214

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