



WIND ENERGY

ONSHORE AND OFFSHORE CAPABILITY



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EXECUTIVE SUMMARY

Whether investing in an existing wind farm or developing a completely new one, owners, operators, investors, insurance companies and developers have to understand and mitigate all the risks before deciding to proceed with a project. Project risks which might affect the project's profitability in the short, medium and long term usually originate during the initial stages of development.

Independent technical advisors such as SGS can evaluate the technical feasibility of the project through a **technical due diligence** during which the risks

probability of occurrence and their potential impact on the project will be detected. The goal is to firstly ensure that the technical feasibility of the project is such that the investment is sound, and secondly to ensure the quality. This is accomplished by way of a thorough review of all the assets and/or the data available to reveal the potential areas of concern for the investor.

In addition to the due diligence during the development and operation phases, SGS supports the customers during the entire life cycle of the project with tender

support, construction and operations monitoring, and providing technical consultancy tailored to the client's needs.

This applies for both onshore and offshore wind farms with no geographic restriction.

LIST OF ACRONYMS

BOP	BALANCE OF PLANT
CC	COMPETENCE CENTRE
CDM	CONSTRUCTION DESIGN AND MANAGEMENT
EPC	ENGINEERING, PROCUREMENT AND CONSTRUCTION
ESIA	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
FIDIC	INTERNATIONAL FEDERATION OF CONSULTING ENGINEERS
ISO	INTERNATIONAL ORGANISATION FOR STANDARDISATION
QHSSE	QUALITY HEALTH SAFETY SECURITY AND ENVIRONMENT
TDD	TECHNICAL DUE DILIGENCE



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1 SGS GROUP

1.1 COMPANY PROFILE

SGS is the world's leading inspection, verification, testing and certification company. SGS is recognised as the global benchmark for quality and integrity. With more than 75 000 employees, SGS operates a network of over 1 500 offices and laboratories around the world.

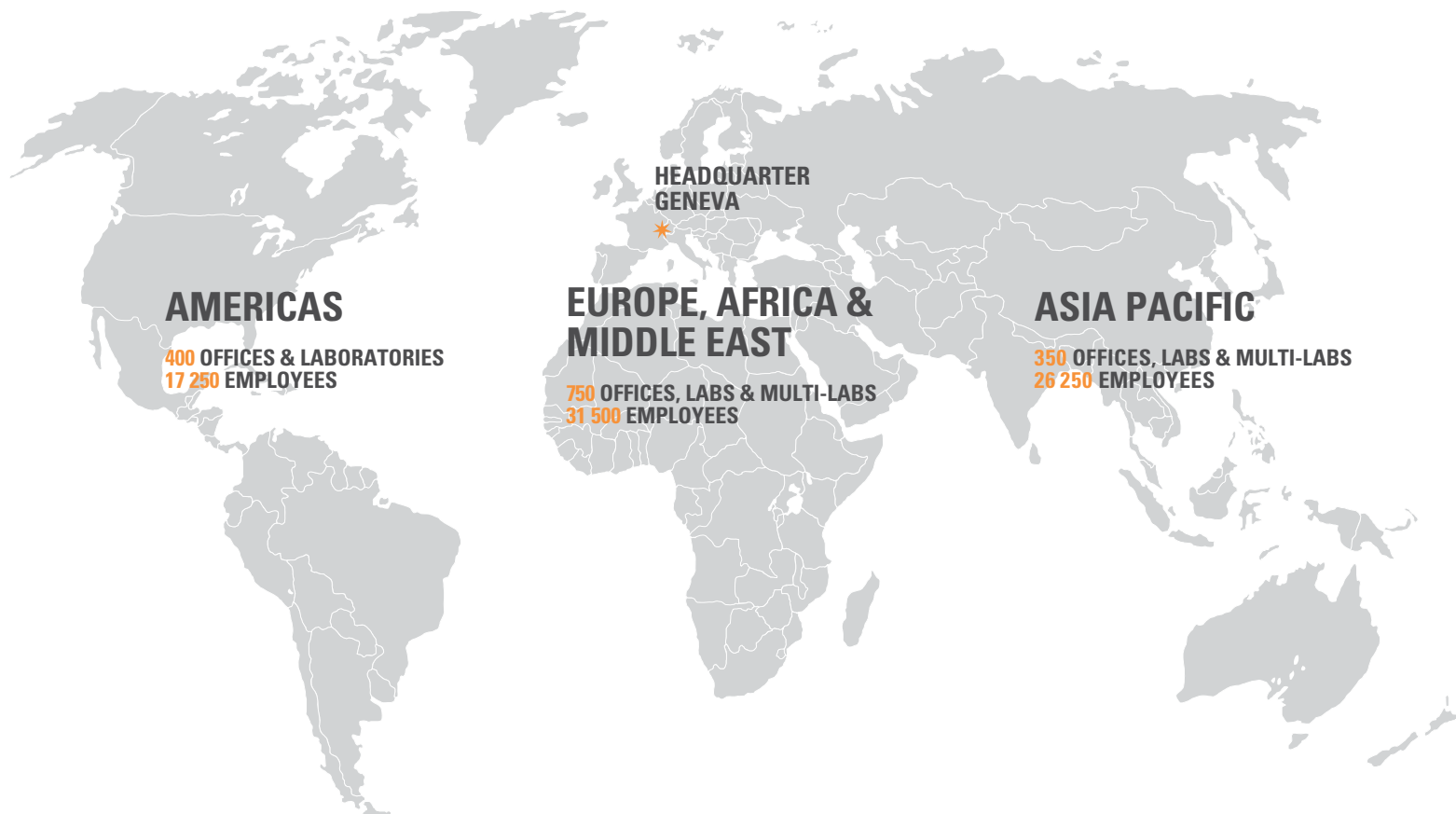
Market capitalisation of US\$10 billion (SWX:SGSN).

Revenue 2011: CHF 4.8 billion.

The company, with headquarters in Geneva, was founded in 1878. This long history has assisted SGS to establish a reputation for independence, integrity, professionalism and experience. The policy of SGS is not to engage in any manufacturing, trading and financial activities which might compromise its independence and neutrality.

SGS is involved in the following business lines

- Industrial Services
- Oil, Gas and Chemicals
- Governments and Institutions
- Minerals
- Environment
- Automotive
- Systems & Services Certification
- Agriculture
- Consumer Testing
- Life Science



SGS HAS SIGNIFICANT EXPERIENCE WITH DELIVERING EXPERTISE TO BANKS (SUCH AS WORLD BANK, EBRD, ING, BNP, CITIGROUP, WEST LB, BBVA, INVESTCREDIT, EIB, JBIC, ETC.).



1.2 QUALITY SYSTEM

Being the world's leading inspection, verification, testing and certification Company, SGS is recognised as the global benchmark for **quality** and integrity. The SGS Group has a compliance programme, based on its Code of Integrity and Professional Conduct, to ensure that the highest standards of integrity are applied to all its activities worldwide in accordance with international best practice.



1.3 FIDIC CONDITIONS

SGS, with its worldwide network, has extensive practical experience with the FIDIC Conditions of Contract, based on various international projects. SGS highly trained experts contribute to the successful execution of engineering construction contracts worldwide in accordance with the FIDIC regulations.

SGS staff has handled successful contracts under FIDIC conditions including for Rymanów Wind Farm in Poland preparing and verifying the contracts according to the yellow book.

1.4 ENVIRONMENT AND SUSTAINABILITY POLICIES

At SGS we believe it is vital to embrace sustainability as a positive challenge; a source of continuous enquiry, innovation and improvement. We contribute to environmental sustainability in many ways through our range of services. Our own business activities also impact on the environment, so one of our priorities is to continuously improve our own environmental performance. Our environmental policy encourages us to minimise our impact on the environment and the communities where we work and live. It also requires our suppliers and business partners to make similar efforts.

The ISO 14001:2004 Environmental Management Systems (EMS) certification enables our clients to demonstrate their commitment to the environment. The standard provides guidance on how to manage the environmental aspects of your business activities more effectively, while taking into consideration environmental protection, pollution prevention and socio-economic needs.



1.5 WIND ENERGY SERVICES

SGS has significant practical experience related to delivering services for power and **wind energy** projects. These services to lender and sponsors comprise feasibility studies, technical advice, technical and environmental due diligence and project monitoring to mention but a few.

For the particular needs of a project SGS is able to dedicate wind experts from its Renewable Energy Support Office (RESO) based in Hamburg which employs globally 120 experts.

SGS supports its clients at a local level with its global affiliates being able to mobilise rapidly additional experts in different locations, should the need arise.

SGS experts have the combined experience and detailed understanding of every aspect of the energy sector, with particular focus on renewable energy, including wind.

SGS offers solutions throughout the wind value chain to answer the critical questions.



2 ONSHORE WIND ENERGY

2.1 TECHNICAL CONSULTANCY

As a market leader in inspection, verification and testing, SGS has a wide deep knowledge in several areas applicable to wind energy and a multi-disciplinary labour force located worldwide allowing SGS to tailor, and deliver efficiently all required services to meet client's requirements from the development to the operation phases of a wind project.

SGS provides technical consultancy with its world class advisors and engineers in different areas of expertise on the technical and commercial parts of the projects.

2.2 FEASIBILITY STUDIES

To support the development of a wind farm project, **feasibility studies** are realised to allow lenders, sponsors, owners and its shareholders to assess accurately the economic feasibility of the project and to identify next steps for its implementation and risks associated with those steps.

The feasibility studies will assess the

- Project site
- Project construction design, costs and scheduling
- Meteorological conditions
- Environmental and social impact
- Terrain and soil conditions
- Regulatory compliance
- Energy production
- Economics

CASE STUDY | LENDER'S ENGINEER



A development bank awarded SGS the contract to assume the Lender's Engineer role for the construction of two wind farms in Romania.

The works started with a due diligence in February 2012 and will continue with the construction and operations monitoring of the wind farms until the end of warranty which is expected to be in 2015.

Services provided

- Lender's Engineer
- Technical Due Diligence
- Project Monitoring
- Operations Monitoring

CASE STUDY | FEASIBILITY STUDY & SITE ASSESSMENT



The Dakar Port Authority (DPA) has initiated a policy to reduce its energy costs. This policy is in the frame of the one initiated by the government of Senegal who launched a broad programme of energy efficiency, reducing electricity costs and promotion of renewable energy (including tax exemption as incentives).

The DPA wants to take this opportunity to explore the possibilities available to invest in clean energy and benefit funding through the Clean Development

Mechanism. To this end, the Port wants SGS as consultant to conduct a study starting in 2011.

SGS will analyse the actual energy consumption and power supply scheme and study both renewable alternatives (wind and solar power supply).

Services provided

- Consultancy services on Renewable Energy
- Energy efficiency audit of the actual assets and buildings
- Alternative renewable power (solar and wind) feasibility study
- Wind site assessment
- Solar site assessment
- Financial evaluation of the alternative renewable solutions
- CDM evaluation: Project Identification
- Technical feasibility study and procurement support for the final option



2.3 SITE & WIND RESOURCE ASSESSMENT

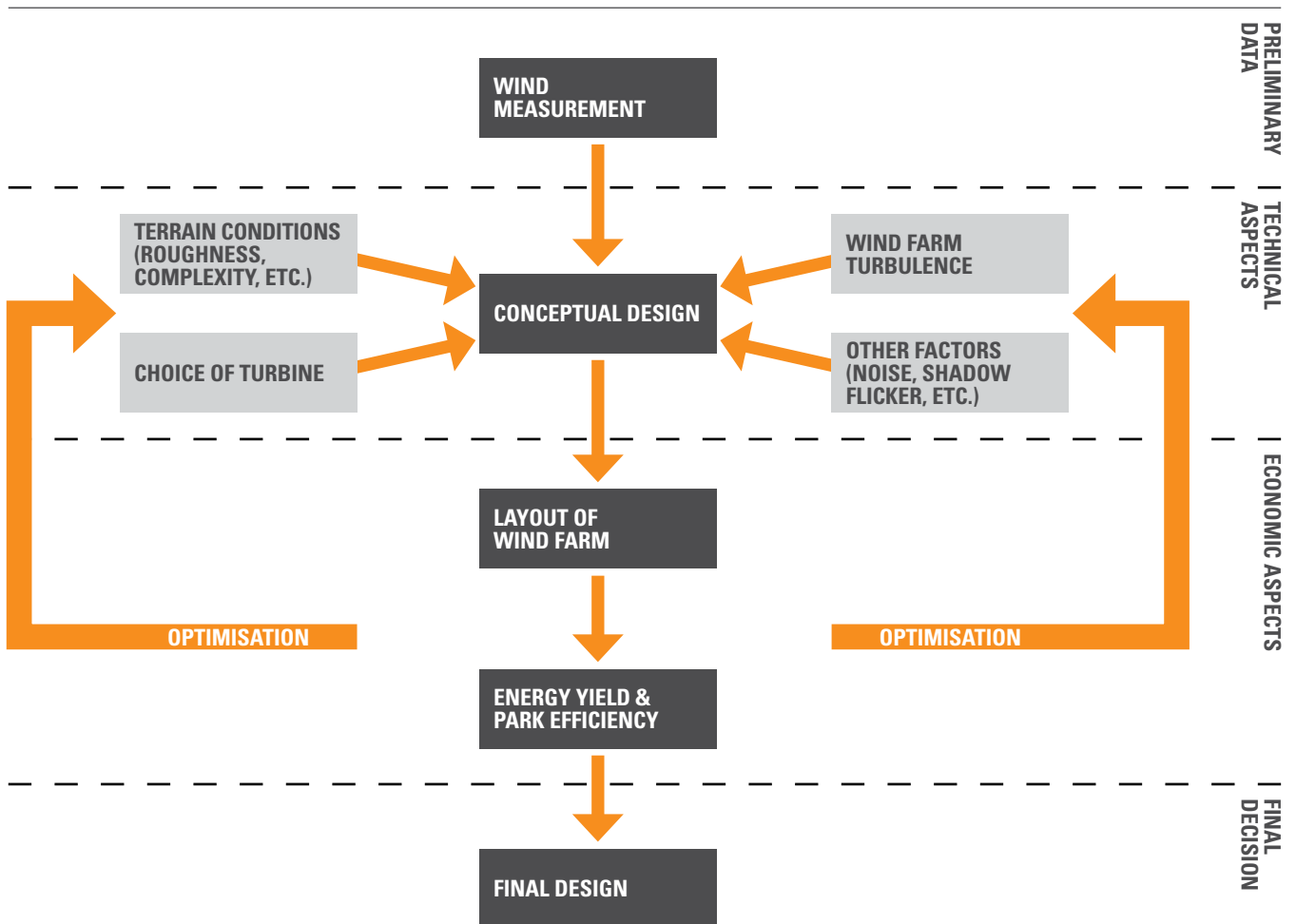
The key to realising successful wind energy project lies in making the correct strategic decisions in the early stages of project development. In parallel with the ever increasing scale of wind projects, in terms of turbine size and turbine number,

the need for reliable and accurate evaluations and calculations of site-specific issues is becoming more acute. **SGS Site Assessment Services** aim to assist our clients in efficiently developing their projects in a reliable and financially sound manner.

The ultimate objective of Site Assessment is to facilitate overall project development

by ensuring the viability, economical soundness and site optimisation of the undertaking.

SGS offers a comprehensive range of project development services, including the optimisation of technical and financial parameters. The following flow chart illustrates SGS's general approach to site assessment services.





2.4 ENVIRONMENTAL AND SOCIAL IMPACT AND PERMITTING

SGS conducts environmental and social impact assessments to determine how your business activities are affecting your local community and on the wider environment. We check your compliance with regulations in place to protect the environment, verify your activities and equipment, permits and documentation.

For a detailed assessment of your environmental performance, you can benefit from our state-of-the-art laboratory and monitoring facilities. Our accredited, experienced technicians have the experience to offer innovative solutions to any challenges facing your organisation. We offer you guidance and assistance in complying with environmental regulations and in reducing your impact on the environment.

We can help you to prepare the necessary documentation for permit and license applications. We can also provide verification of your paperwork to show regulators your compliance and stakeholders your commitment to environmental protection.

Key elements included are

- Biodiversity and ecosystems (birds, bats, mammals, plankton, etc.)
- Hydrology and geological constraints
- Safety, visual and noise impact
- Shadow flicker
- Land use and tenure
- Social analysis
- Historic and cultural heritage
- Permits

CASE STUDY | ENVIRONMENTAL IMPACT ASSESSMENT



Between 2008 and 2011 SGS conducted a sort of environmental and site studies for the Wallonia state in Belgium.

Services provided

- Environmental Pre-Feasibility Study
- GIS Mapping (location searching and decision support)
- Environmental Impact Assessment (birds, bats, landscape, territory setting)

2.5 ELECTRICAL DESIGN AND GRID INTERCONNECTION

SGS assesses the technical and practical considerations required for a wind power grid connection, reviews the electrical design of wind farm projects and identifies the least cost point of connection assessing the impact of the proposed power connection cable route.

The assessments undertaken cover the complete range of system integration issues, including

- Voltage profiles and quality
 - Thermal and fault ratings
 - Harmonic and transient performance
 - Generation and system constraints
- stakeholders your commitment to environmental protection.

2.6 RISK MANAGEMENT

Through its Risk Management consultancy service, SGS offers complete Risk Management for wind farm projects. SGS risk specialists support the project management team in risk identification, risk qualification and risk handling, which entails both risk mitigation and capitalisation of opportunities. Once the necessary data has been collected, quantitative risk analyses and data simulations using specialised software are performed in an effort to predict the outcome of risk management and the results of risks, including pre- and post-risk handling, the potential impact of risk handling plans and the implications of residual risks.

The **SGS Risk Management** consultancy service seeks to assist project teams in their decision-making process in order to ultimately ensure that the project is executed with minimal risk impact. Specifically, SGS's Risk Management process aims to achieve the following

- Meet project objectives in terms of cost, schedule and performance
 - Improve cost estimates by managing realistic and relevant contingencies
 - Achieve identifiable schedule milestones and key performance indicators, including occupational health and safety and environmental targets
 - Increase planning reliability
 - Assure greater certainty in financial planning and project execution
- manage complexity of interfaces at the project level

CASE STUDY | LENDER'S ENGINEER



Raiffeisen Bank Polska S.A. awarded SGS the contract to assume the Lender's Engineer role for the construction of Krzecin Wind Farm in Poland.

As Lender's Engineer, SGS provides services from the development phase to the operation phase of the project.

Services provided

- Lender's Engineer
- Technical Due Diligence
- Project Monitoring

2.7 PROJECT EXECUTION

SGS's Project Execution service brings together a variety of skills and expertise with the objective of aiding our clients to successfully realise the transport, installation and commissioning phases of their renewable energy projects. In an industry plagued by a lack of qualified professionals, SGS excels in bringing expert knowledge and experienced personnel to the project team to successfully and proficiently undertake such management throughout the realisation of a project.

SGS thereby ensures that our client's projects progress from a green field site to a fully-commissioned wind farm in a safe and efficient manner while meeting cost, schedule and quality targets.

SGS delivers individual or package of services within all the activities such as procurement, engineering, environment, legal, permitting and financing for

- Tender Support
- Construction Monitoring
- Commissioning Survey

CASE STUDY | OWNER'S ENGINEER

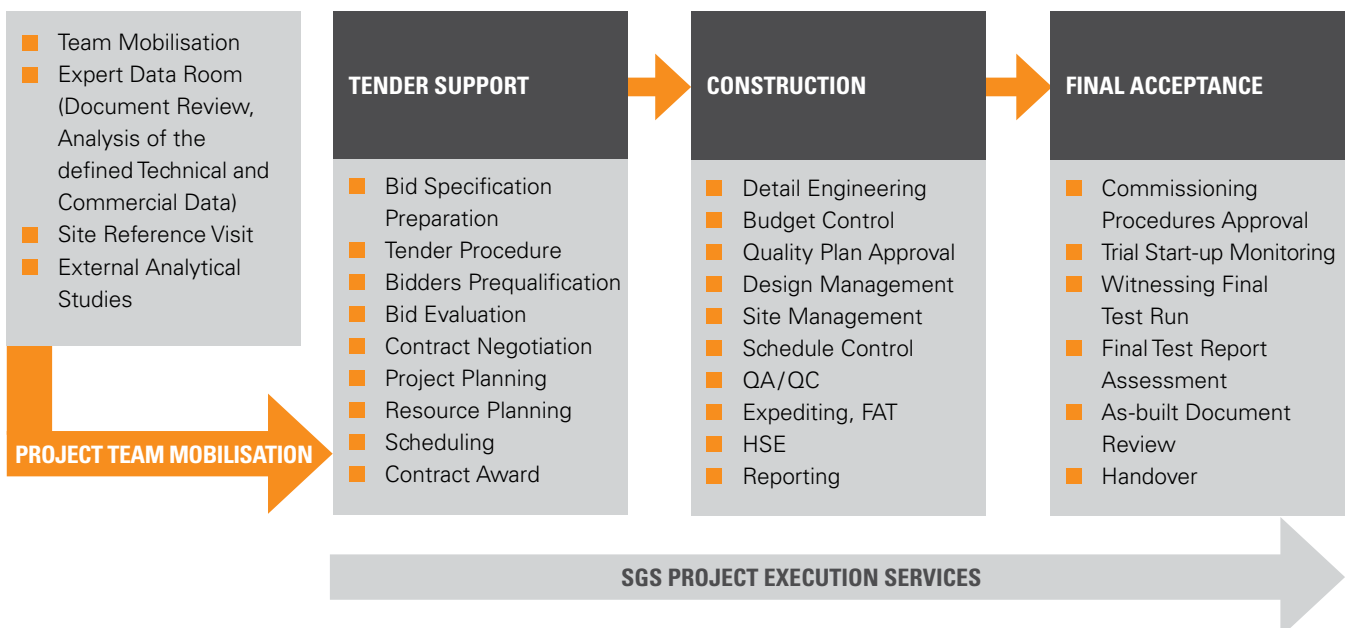


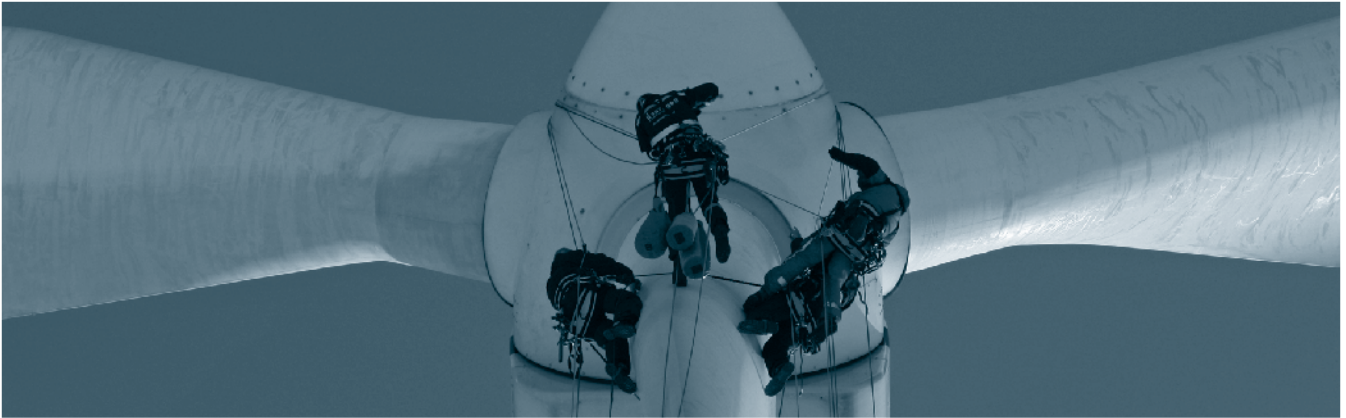
RWE Innogy GmbH awarded in 2008 SGS the contract to assume the Owner's Representative role during the construction in its first wind farm in Poland. Suwalki wind farm is located in the north-eastern part of Poland.

As Owner's Engineer, SGS provides services from the development phase to the Commissioning phase of the project.

Services provided

- Tender Evaluation
- Owners Representation
- Construction Supervision
- Health, Safety, Security and Environment
- Consultancy & Special Services
- Project Monitoring





2.8 OPERATIONS MONITORING

Minimising down-time is essential for ensuring the profitable operation of a wind farm. Damage must be recognised early so that appropriate measures can be promptly taken. Doing so can prevent consequential damages and allows maintenance-related shut-downs to be planned well ahead of time.

SGS will review and opine on all the maintenance and operations record documents and procedures during the operation of a wind farm and carry out end of warranty inspections to determine the current status of the wind turbine, detect and identify possible initiation of damage and to help avoid secondary damages.

To ensure that, SGS provides **in-service inspections** carried out in accordance with the standard guidelines in force which comprise the following activities

- Inspection of the rotor and rotor blades
- Testing of the safety functions and devices
- Inspection of the machinery and electrical components
- Inspection of tower and foundation
- Vibration analysis of the drive train
- Analysis of the gear oil
- Inspection of the gearbox's bearings by video endoscopy
- Inspection to the lightning protection system
- Inspection of the general condition of the wind turbine

CASE STUDY | END OF WARRANTY INSPECTIONS



John Deer awarded SGS to perform end of warranty inspections in two wind farms in the United States. Sunray in Texas and Brewster in Minnesota.

The services provided were

- In-service Inspections
- Inspection of the rotor blades
- Test of the safety functions and devices
- Inspection of the machinery and electrical components
- Inspection of tower and foundation
- Inspection of the general condition of the wind turbine
- Vibration analysis of the drive train (main bearings, main gearbox and generator bearings)
- Oil analysis of the gear oil
- Video-endoscope inspection of the gearboxes
- Lightning protection

3 OFFSHORE WIND ENERGY

3.1 TECHNICAL CONSULTANCY

The offshore environment is a demanding one for wind farm projects, increasing the value of technical and commercial consultancy services in every stage and area of the project.

SGS technical knowledge in a variety of areas combined with the understanding of key financial and commercial concerns brings experience dealing with regulatory, permitting, environment, construction and operation issues which are necessary to achieve connection, operation and revenue for a wind farm.

3.2 FEASIBILITY STUDIES

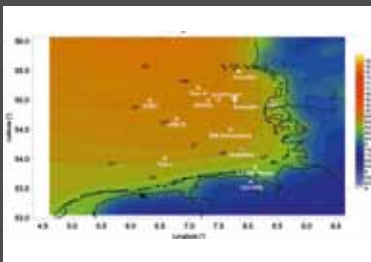
To support the development of a wind farm project, feasibility studies are realised to allow lenders, sponsors, owners and its shareholders to assess accurately the economic feasibility of the project and to identify next steps for its implementation and risks associated with those steps.

In particular, for offshore projects, SGS will also look at the marine processes assessing all marine impacts on shipping activities and fisheries as well conduct the necessary marine surveys required for projects viability.

The feasibility studies will assess the

- Project site
- Meteorological conditions
- Environmental and social impact
- Seabed conditions
- Regulatory compliance
- Project construction design, costs and scheduling
- Energy production
- Marine surveys (warranty, hydrographical, geotechnical, etc.)
- Marine impact assessment

CASE STUDY | TECHNICAL DUE DILIGENCE



The Maguerite Fund awarded in 2011 SGS the contract to perform a technical due diligence to the Butendiek Offshore Wind Farm in Germany.

SGS conducted a full documents review to permits, contracts, wind resource measurements, energy yield calculations, wind turbine design, electrical design, substation design, foundations design, Capex, Opex, O&M procedures, project scheduling, Environmental aspects, etc.

Services provided

- Technical Due Diligence

CASE STUDY | QHSSE MANAGEMENT



The Belwind Wind Farm is located on Bligh Bank, 46 km (29 mi) from the Belgian port of Zeebrugge. Bligh Bank is the first stage of what is planned to be a 330 MW project.

SGS was awarded a contract to provide Quality, Health, Safety, Security and Environmental (QHSSE) services that included inspections and marine warranty surveys. The key objective of QHSSE Management was to optimise the revenue generated by any wind farm project over its life span, by assuring high quality standards and safe project execution during the development and realisation phase.

Services provided

- QHSSE
- Quality control for all works
- Schedule control
- Commissioning inspection
- Marine Warranty surveys



3.3 SITE & WIND RESOURCE ASSESSMENT

For offshore projects an accurate estimate of the projects future energy yield is required to support investment and financing decisions.

With the site assessment and wind resource services offered by SGS, investors, owners and developers will be sure of the site characteristics, the suitability of the chosen wind turbines including optimisation of technical and financial parameters. Defined in SGS' approach for onshore projects the assessment covers

- Site and wind data analysis
- Wind flow modelling
- Energy yield calculations
- Uncertainty analysis
- Wind turbine assessment
- Layout optimisation

3.4 ENVIRONMENT AND SOCIAL IMPACT, AND PERMITTING

SGS conducts environmental and social impact assessments to determine how your business activities are affecting your local community and the wider environment. We also check your compliance with regulations in place to protect the environment, and verify your activities, equipment, permits and documentation.

We can help you to prepare the necessary documentation for permit and license applications. We can also provide verification of your paperwork to show regulators your compliance and stakeholders your commitment to environmental protection.

CASE STUDY | TECHNICAL DUE DILIGENCE



Q7 is a 120 MW offshore wind farm located furthest offshore and placed in the deepest water in Belgium started its operation beginning of 2008.

Van Oord assigned to SGS the following services

- Technical Due Diligence
- Project Supervision
- Design Review
- Document Review
- Quality Assurance/Quality Control
- Coordination of weld inspections of secondary steel in Poland
- Coordination of paint inspections in Poland and Denmark
- Supply of QC inspector to Denmark during assembly of High Voltage Off-Shore Station
- Coordination for review of Manufacturing Data Dossier of High Voltage Station
- Review of NDT test results for High Voltage Station

3.5 ELECTRICAL DESIGN AND GRID INTERCONNECTION

SGS provides electrical design and grid system integration analyses on a technical and economic point of view including reviewing and supporting the client on all the on-offshore electrical systems aspects, interconnection agreements and handling issues like

- Downstream reinforcement
- Electrical protection
- System control
- Interfaces and technical standards
- Harmonics
- Payment and other commercial arrangements



3.6 RISK MANAGEMENT

As in any project, including offshore renewable energy projects, SGS Risk Management consultancy service seeks to assist project teams in their decision-making process in order to ultimately ensure that the project is executed with minimal risk impact supporting the project management team in risk identification, risk qualification and risk handling, which entails both risk mitigation and capitalisation of opportunities.

This includes

- Meet project objectives in terms of cost, schedule and performance
- Improve cost estimates by managing realistic and relevant contingencies
- Achieve identifiable schedule milestones and key performance indicators, including occupational health and safety and environmental targets
- Increase planning reliability
- Assure greater certainty in financial planning and project execution manage complexity of interfaces at the project level
- Energy yield estimates based on resource assessments

3.7 QHSE

In order for our clients to comply with UK and pan European legislation, SGS provides a strong CDM* service. Within the wind energy sector, particularly the offshore environment, there has been an increased level of activity and subsequent rise in the number of accidents with serious injuries and fatalities.

CASE STUDY | RISK MANAGEMENT



The Lincs Wind Farm, sponsored by Centrica Renewable Energy and two other joint-venture partners, is a proposed 270 MW wind farm being

built 8 kilometres (5.0 mi) off Skegness on the east coast of England. The project, due to be operational in 2012 and is construction started in March 2011.

SGS is providing Risk Management services including the following

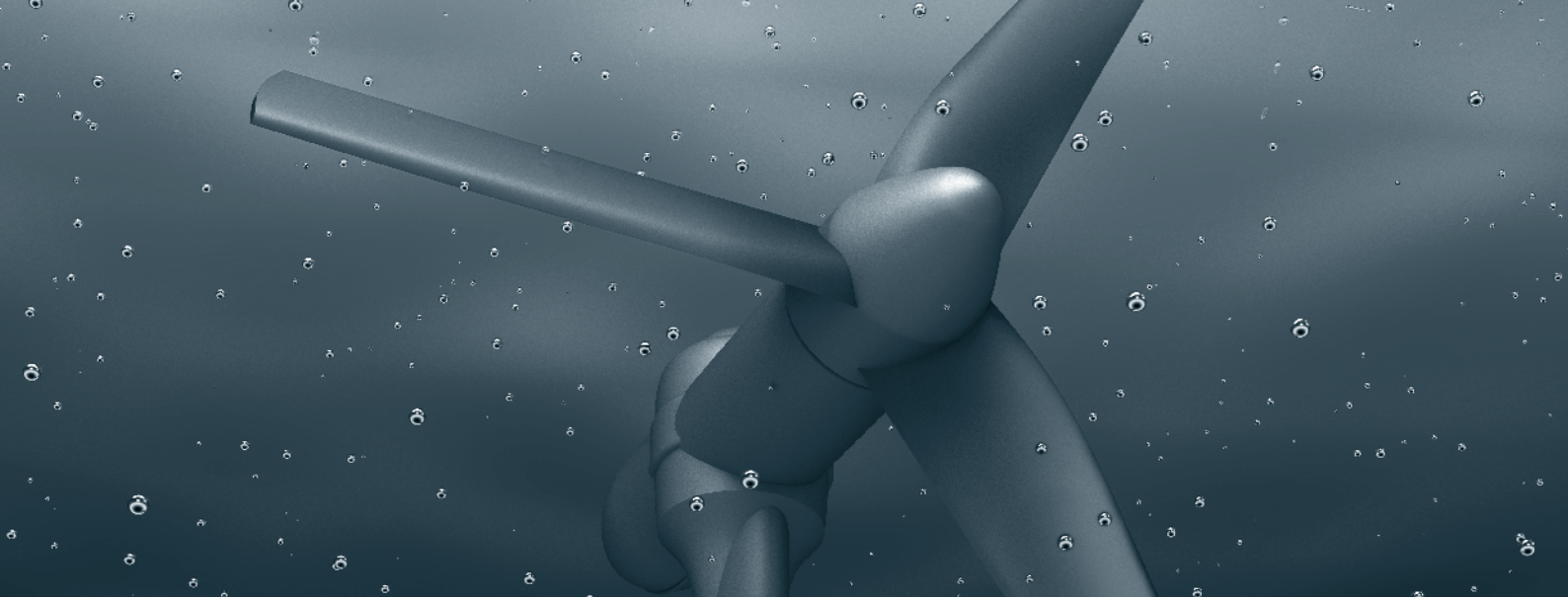
- Risk Management procedures and guidelines
- Quantitative risk analysis
- Technical risk management reports for specific phases
- HSE management
- Loss of production risk analysis
- CAPEX risk analysis
- Contingency forecast

SGS CDM services include

- Notifying the Health and Safety Executive F10
- Training and supervision of the designers in the production of the Design Risk Register
- Reviewing Intention to Tender (ITT) packages
- Ensuring that all reports regarding Pre-Construction Information (PCI) are complete
- Reviewing Final PCI for inclusion in the ITT Packages to Principal
- Reviewing Principal Contractors for competency
- Reviewing the Construction Phase Plan prior to construction
- Carrying out CDM training for the client project team
- Updating F10 to HSE
- Formulating the Health and Safety File (HSF) for the client requirement

- Ensuring that the project documentation system collects "as built" information for the HSF
- Reviewing the Decommissioning Plan for inclusion in the HSF
- Interfacing with the Operational and Maintenance function during installation and commissioning
- Ensuring that all certification and compliance documents are with the client prior to handover of the assets

* These regulations consolidate Directive 1992 / 57 / EEC (minimum health and safety requirements at temporary or mobile construction sites)



3.8 APPLIED CONSTRUCTION, DESIGN AND MANAGEMENT REGULATIONS

APPLIED CDM-C SOLUTIONS FOR SGS CLIENTS

The level of activity in the renewable sector has suddenly increased due to round-three licenses being issued. While clients and developers meet the challenges of working on and offshore, they are encountering changing and complex legislation mainly because of the recent BP incident in the Gulf of Mexico. SGS delivers solid solutions to clients who want to be sure of the highest standard.

THE SGS APPLIED SOLUTION FOR LICENCES

Usually, when the client applies for a license from Crown Estates, local authorities, and/or banks, they are presented with a complicated set of pro-formas that must be submitted to CE. When completed, these forms must illustrate the client's specific plans and arrangements for health and safety management competency relevant to the project in question and their ability to satisfy important third parties that these goals will be reached during construction. SGS readymade solutions guarantee success.

THE SGS APPLIED SOLUTION FOR CDM REGULATIONS

Once the required licenses are obtained project managers will encounter the rigid mandate of the CDM process.

CDM regulations provide a clear framework to hold project health and safety aspects together which serve the client business risk model well.

Duty holders under the regulations are

- Client
- Principal Contractor
- CDM-Coordinator
- Designer and Contractors

The most significant issue for all duty holders is competency. All duty holders must be able to clearly illustrate competency based on hard evidence.

Because of this, clients taking advantage of SGS support are required to prepare detailed control documentation addressing existing and potential issues to be submitted upon the signing of each contract. Critical documents are

- Design Risk Analysis
- Site Reports
- Pre-Construction Information
- Construction Phase Health and Safety Plans
- Health and Safety Files
- Risk Registers

Three regulation aspects to be considered upon commencement of construction works

1. Controlling Documentation

Today, most clients will have an extranet facility or FTP site such as 4 Projects or Think Projects (European) and CDM-C would most likely have an input into the container sub-file structure. SGS protected IT documentation solutions are in place.

2. Managing Change

Designers are encouraged to use Requests for Information (RFI) and Technical Queries (TQs) at early stages to minimise any lack of clarity and achieve good and sound design according to client specification. SGS experts manage this important process.

3. Documenting "as built"

Final documentation of information vital to complete health and safety files (HSF) as required by CDM regulations is uploaded onto the extranet and collected in the CDM container. This point is worth emphasizing as the "as built" and O/Ms are very often difficult to pursue after PC or contractors move on. These important documents are necessary in order to transfer assets. SGS supports each client in the procurement of this vital information from the conception of works through to delivery and sign off.



THE SGS APPLIED SOLUTION TO PROTOTYPE TESTING AND CONTRACT COMPLEXITY

A number of issues can cause problems for duty holders during CDM work. These issues are usually handled at the early stages of the project in the form of a CDM strategy document. These issues include

- Non-Disclosure Agreements (NDAs)
- Deployment of Prototype
- Complex Duty Holder's Arrangements
- Consortia
- Sale of Assets

NDAS

For research and development purposes, clients implementing prototype wind, wave and tidal devices in their projects may wish to deploy such a device at the EMEC (Orkney) site or the NaREC site (Blyth). In both cases, strict NDAs required for CDM I would be introduced at the design stage.

Designers must provide drawings and specifications clearly illustrating design safety and risk reduction mitigations. SGS fully understands the importance of NDA regulations being in place from the start of all such projects.

DEPLOYMENT OF PROTOTYPES

Usually deployment means carrying out trials at sea, at the NaREC test centre in Blyth, at other marine research establishments or at universities. Complete devices or component parts or sub-assemblies may be deployed. This experimental stage requires particular scrutiny for procedures, risk assessments and method statements (RAMS). Tests can simulate destruction or catastrophic failure and identify any extra precautions which may be required. SGS Applied Solution supplies the necessary support when dealing with CDM zones and marine corridors.

COMPLEX DUTY HOLDER ARRANGEMENTS

It is not unusual for clients to also be the designer and the PC. Part of the SGS CDM strategy document would be to detail various duty holder responsibilities and to ensure that those details are clearly expressed in contract arrangements.

CONSORTIUMS

Some projects include consortium arrangements. However, HSE requires a clear agreement within consortiums that only one member act as client in order to ensure effective and clear management of mandated client duties. Other members of the consortium providing design or construction facilities would be registered as duty holders in those capacities. SGS manages consortium processes as required by the client.

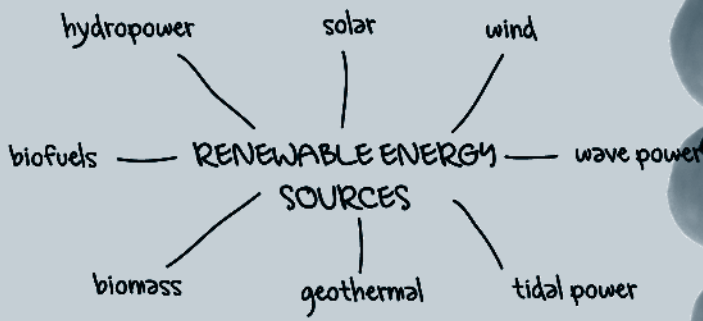
SALE OF ASSETS

Any sale of assets may have CDM implications. For example, when only part of an array is sold to a third party individual health and safety files are required for that part of the asset.

This would include clear instruction for the operation and maintenance of the asset part and a coordination and cooperation management arrangements for the safe operation of any particular asset site. In this situation, SGS would appoint a CDM-C to be deployed to manage HSF arrangements.

THE SGS APPLIED SOLUTION TO MAKING CLIENTS LEGAL DUTIES COMPLIANT

In order to deem legal duties compliant, the key legislative framework within which the project will be developed and operated must be respected and followed. This framework is normally determined at the beginning of the project and issued with the ITT documents (tenders).



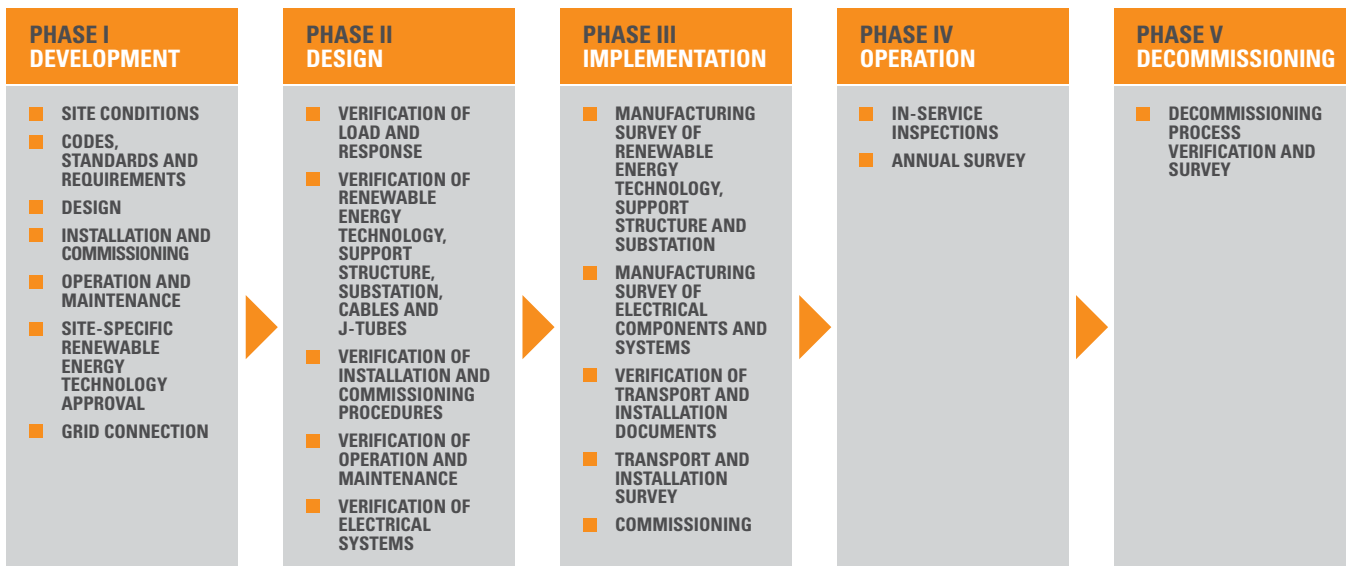
HEALTH & SAFETY AT WORK ETC. ACT 1974	Check all operations are compliant. Tool box talks and induction carried out at site and recorded.	Audit
MANAGEMENT OF HEALTH & SAFETY AT WORK REGULATIONS 1999	Check all operations are compliant. HSE Plan in place by PC and has been audited and signed off and available on site.	Audit all activities as they come on plan pre-construction and sign off prior to commencement of works.
THE ELECTRICITY AT WORK REGULATIONS	Current site supply to be identified.	Audit and Inspection by the PC HSE manager
WORKPLACE (HEALTH, SAFETY & WELFARE) REGULATIONS 1992	Welfare facility on site to be inspected by and fit-for-purpose checked	Regular Audit and inspection
REPORTING OF INJURIES, DISEASE AND DANGEROUS OCCURRENCES (RIDDOR) REGULATIONS 1995	Reporting system to be in place and compliant, if required. In addition, near hit cards available to all operatives.	To be regularly monitored and details report back to H&S Committee meetings. Also daily meetings and monthly reports.
PROVISION & USE OF WORK EQUIPMENT (PUWER) REGULATIONS 1998	All contractors to review monitor and test equipment and provide compliance certificates.	Subject to audit Company requirement to identify all work related owned equipment. On-site equipment to be reviewed and inspected.
DIVING AT WORK REGULATIONS 1997	Diving Plans must be in place prior to all diving activities. Emphasis on supervision, and independent assessment.	Audit and Review
MCA CODE FOR WORK VESSELS	All vessels must be compliant within the code for the activities for which they may be deployed.	Audit and Review
CORPORATE MANSLAUGHTER ACT 2008; CORP. HOMICIDE ACT 2007	Companies need to take obligations regarding H&S law seriously, Managements systems should be kept under review.	Audit and Review Management systems
CDM REGULATIONS 2007	Register project on F10, duty holders clearly defined and CDM strategy in place.	Appoint CDM-C

3.9 PROJECT CERTIFICATION

Project Certification is the ultimate process to assure the required Quality of an Offshore Renewable Energy Project throughout the project life cycle. Based on the German Federal Maritime and Hydrographical Agency (Bundesamt

für Seeschifffahrt und Hydrographie – BSH) standards ref. /4/ and ref. /5/, this procedure verifies that the project complies with the project specification and other requirements defined by the proponent monitoring the project development, construction and operation phases.

The **Project Certification** process is divided in phases and covers the wind turbine, the support structure and the offshore substation, cables and J-tube.



CASE STUDY | PROJECT CERTIFICATION



Global Tech I is one of the first commercial offshore wind farms in the German North Sea. With a total of 400 MW of power installation Global Tech I was awarded as the “Wind Deal of the Year 2011” by the renowned magazine Project Finance International.

SGS was assigned to undertake the project certification under the BSH standards from Phase II up to phase V. The works started in 2009 and still ongoing.

- Phase II Design Verification
- Phase III Implementation survey
- Phase IV Operation survey
- Phase V Decommissioning survey

4 THE TEAM

4.1 KEY WIND TEAM MEMBERS

SGS is able to dedicate wind experts from its Power and Utilities Team based around the world and employs globally 120 wind power experts. SGS supports its clients at a local level with its global affiliates being able to mobilise rapidly additional experts in different locations, should the need arise.

SGS experts have the combined experience and detailed understanding of every aspect of the wind sector.

ROBERT SPEHT	<ul style="list-style-type: none"> ■ Over 15 years of experience in the renewable energy sector, specialising in wind power ■ Lender's engineer due diligence for onshore and offshore wind projects ■ Analysis of renewable energy technologies ■ Advice to clients on risks and rewards associated with renewable energy sources and potential income streams ■ MSc Renewable Energy Systems Technology, University of Loughborough, 1998; BEng Mechanical Engineering with German, University of Wales, Swansea, 1997
JULIO LARA MARTINEZ	<ul style="list-style-type: none"> ■ Industrial Engineer/Project Director with 23 years experience ■ Technical Due Diligence to lenders and equity investors, technical assistance to developers and sponsors ■ Project management and management of teams for consultancy assignments, feasibility studies, design studies, cost control, planning control & quality supervision ■ Industrial Engineer (Mechanical specialty), Superior Technical School of Industrial Engineering Polytechnic University of Madrid, Master in Construction Companies & Real Estate
JOSE ANTONIO IRAUNDEGUI ECHEVERRIA	<ul style="list-style-type: none"> ■ Industrial Project Manager with over 30 years experience ■ Skilled in full management of international industrial projects ■ Technical assistance and quality consultancy to clients ■ Fabrication inspection and supplier evaluation (quality audits) ■ Master in Environmental Engineering (EOI), 1987, Master in Total Quality Management (TQM) (Madrid Polytechnic University), 1989, Six Sigma Black Belt, 2003
NICOLAE DAMIAN	<ul style="list-style-type: none"> ■ Energy Power Engineer ■ Project Manager/Supervisor on power engineering projects ■ Experience in various areas of electrical installation, execution and supervision
SANTIAGO MAZZUCHELLI	<ul style="list-style-type: none"> ■ 18 years professional experience ■ Financial due diligence to lenders and equity investors, financial assistance to developers and sponsors ■ Tender Documentation, bid preparation and negotiation ■ Project management and management of teams in Renewables, utilities, transport, real estate & telecoms sectors. ■ Bachelor in Economics 1990, Master in Business Administration 1991, Masters in Financial Management 1999, Masters in Futures & Derivatives 2003
RICHARD LORD	<ul style="list-style-type: none"> ■ Over 20 years experience in the renewable (Wind) industry ■ Site selection, land owner options & leases and site permitting for wind farm developers ■ Project development of wind farms ■ Wind farm management ■ BSc (Hons) Mechanical Engineering, Nottingham University 1966, MBA, Cranfield School of Management 1980
GABRIEL GHEORGHIU	<ul style="list-style-type: none"> ■ Architect with over 25 years experience ■ Consultancy & site supervision of projects ■ Technical evaluation and due diligence of projects ■ Technical due diligence and inspection of wind farm projects ■ Architect Bachelor Degree, Bucharest Institute of Architecture
THOMAS MEYER	<ul style="list-style-type: none"> ■ Over 16 years of experience in project and programme management. Global Operations Manager for the Project Finance Services of SGS ■ Project finance: project screening and assessment, economic and financial modeling, technical and economic due diligence. Technical assistance to governments, utilities and developers. Policy dialogue ■ Project management: management of teams for consultancy assignments, feasibility studies, design studies and works supervision ■ Procurement of goods, works and services: tender documentation preparation, bid analysis and contract negotiation ■ Sectors: power, energy, water & wastewater, utilities ■ Graduate Civil Engineer, Ecole Polytechnique Fédérale de Lausanne, Switzerland ■ Master of Science (MSc) in Civil and Environmental Engineering (Project Finance and Geotechnical Engineering), Massachusetts Institute of Technology (MIT), USA
AXEL SCHWEIGHARDT	<ul style="list-style-type: none"> ■ Over 11 years of experience in wind farms design, wind turbines technology; procurement and O&M. Technical due diligence and project management. Quality control of services including maintenance and repair. Evaluation of investment data. End of warranty survey, damage and root cause analysis, performance and assistance in vibration measurements of mechanical and electrical components, wind turbine inspections and final acceptance ■ Degree at the Hamburg University of Applied Science (FH) Hamburg Environmental Engineering
OLAF ROBENEK	<ul style="list-style-type: none"> ■ Senior Wind Turbine Inspector. Team leader of SGS Germany for In-Service Inspections On-Offshore ■ Technical due diligence, Inspections on-site, End-of-warranty inspections, condition monitoring, blades, tower and Machinery inspections (mechanical and electrical), Evaluation of data and measurements as well as reporting, rope access technique (IRATA level 3); video-endoscope, offline vibration measurement of drive train and thermography of electrical components ■ Mechanical Engineering at the University of Applied Science Lübeck, Germany
STUART HERBERT	<ul style="list-style-type: none"> ■ Manager UK Renewable Energy – SGS UK ■ A former Royal Naval Officer, Rank Lieutenant RN with an exceptional depth and breadth of technical expertise spanning on-offshore wind, marine and solar renewable technology ■ Business development, due diligence, project management, technical evaluation and research to assess technical feasibility, practicality of development, commercial viability/profitability and market need ■ Edinburgh University studied Msc Advanced Processing ■ Post Graduate Course – Aerodynamics/Transmission and drivetrain/Electrical Generation) ■ B.Eng (Hons) – Electrical, Mechanical Engineering and Aerodynamics)
LEONARDO FURTADO	<ul style="list-style-type: none"> ■ Risk Analysis Expert ■ Project management and project risk management with experience in offshore wind farm projects and a very good understanding of Project Risks, Critical Path, Float, "S" Progress Curves, Project Cash Flow, Schedules, WIP (Work in Progress), KPIs for Projects and Business Units, Facilitated Risk Sessions, Currency Risk Exposure and Project Risk Mitigation Plans being part of his day-by-day vocabulary, Optimization, Budget & Forecasting, Financial Valuations, Consolidation of Financial & Risks Data ■ BA Business Administration and Finance, FGV Sao Paulo, Brazil ■ BSc – Civil Engineering, UFG, Goiania, Brazil ■ MSc Decision Sciences, London School of Economics (LSE)

ALBERT LAW	<ul style="list-style-type: none"> ■ Risk Analysis Expert ■ Risk analysis and management, Project management, Verification of component failure data, Probabilistic Safety Analysis (and RiskSpectrum PSA software), Fault Tree and Event Tree Development/Analysis, Reliability Data Derivation, Bayesian Analysis (and R DAT Plus software) ■ MEng Aeronautical Engineering – First Class Honors. Awarded the Aeronautics, C.F. Rae Griffin 'Outstanding MEng Project' Prize Award
DANCHO BOZHILOV	<ul style="list-style-type: none"> ■ Senior Electrical Engineer ■ Technical due diligence, project finance structure, working with the finance community, private equity, banks and other institution, dealing with energy legislation, regulation. Bank subsidy and financial initiative schemes ■ Support to electrical design activities including design calculations for offshore wind farms, cabling design, power quality assessments and Grid code assessments ■ Specification of major electrical components for offshore wind farms, including Transformers, reactive compensation equipment, and analysis of the turbine electrical performance ■ Preparation of technical specifications and design verifications for electrical equipment, technical bid evaluations, preparation of Installation Method Statements in conjunction with equipment and client specifications and health and safety requirements, for the site works ■ Wind turbine inspections, O&M management, calculation of energy losses within the distribution system and deep knowledge of Software and Data, SCADA systems, subsea cable specification and installation methodology and connection to the National Electrical Grid
NICULAE ANDREI	<ul style="list-style-type: none"> ■ Over 26 years of experience in Construction management, Quality and production management. Strong experience in product certification and local regulations. SGS Project Manager/Supervisor for construction including wind farms. Technical due Diligence, Project Management, regulatory compliance and procurement ■ Bucharest Polytechnic Institute, Chemistry – Silicate compounds/Construction Project Management
JULIA SCHAEFFER	<ul style="list-style-type: none"> ■ Technical due diligence, Project management. Specialist in renewable energy projects with a good understanding of renewable energy technologies such as onshore and offshore wind, solar, biogas and marine with an understanding of energy economics and national energy policies ■ Experience in wind farm projects for lenders, investors, governmental organizations and project developers in wind and solar due diligences, construction monitoring assignments and technical advice services with a focus in eastern European countries ■ Diploma as Industrial Engineer (with specialisation on energy and environmental management), University of Flensburg, Germany
CHRISTIAN NÜBOLD	<ul style="list-style-type: none"> ■ Head of Department, Technical Office Wind Energy (TOW) ■ Experience in project management, project certification for offshore wind farms and procurement ■ Civil/Structural Engineering at the Technical University of Braunschweig (TUBS) with specialization in Hydromechanics and Coastal Engineering, Hydraulic Engineering, Soil Mechanics/Foundation Engineering
ANDREW BEATTIE	<ul style="list-style-type: none"> ■ Over 10 years of experience within the wind energy business. ■ Site Assessment expert with project management skills and experience in on-offshore projects ■ Technical due diligence, energy yield calculation, analysis of power curve performance, site suitability, site design, layout optimization, feasibility studies, GIS, O&M ■ Master of Science (MSc) in Renewable Energy Systems Technology from Loughborough University, UK ■ Bachelor of Science in Environmental Science and Policy from Liverpool John Moores University, UK
MARIUSZ PRACOWNIK	<ul style="list-style-type: none"> ■ Over 7 years of experience in construction including within wind energy ■ Project Management, technical due diligence, EPC works ■ Head of the wind energy section at SGS Poland. Experienced Project Manager working in wind farms construction, acting as owner's engineer, providing tender support for developers and working in technical due diligences for lenders ■ Master of Science Geodesy and Real Estate Valuation, University of Warmia and Mazury in Olsztyn, Poland ■ Postgraduate specialization in wind farms, The technical Science University of Bydgoszcz, Poland
MAREK KIERSNOWSKI	<ul style="list-style-type: none"> ■ Over 35 years of experience providing inspections in the industry including within wind energy ■ High qualified inspector specialized in NDT and Quality Assurance and Control with extensive experience in wind farm projects including construction supervision, expediting, QA/QC inspections, acceptance tests, welding and mechanical works supervision and technical due diligences. ■ MS Mechanical Engineering, Warsaw University of Technology, Warsaw, Poland
MICHAL ZYGADLO	<ul style="list-style-type: none"> ■ Experienced mechanical engineer working within the wind energy ■ Project management, site management, construction supervision, commissioning survey, inspections, and quality control ■ MEng Studies in quality engineering and road traffic engineering; Technical University of Szczecin, Poland
PAULO MENDES	<ul style="list-style-type: none"> ■ Over 10 years of experience within the aerospace and wind energy sectors ■ Global Support Manager for the renewable energy business ■ Project management, technical due diligence, procurement management ■ MEng Aeronautical Engineering, Universidade da Beira Interior, Portugal ■ Post graduation, Renewable Energy Physics, Universidade de Aveiro, Portugal

CONTACT

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A SELECTED WIND PROJECTS

CLIENT PROJECT	POWER (MW)	LOCATION	YEAR	SERVICES
DEVELOPMENT BANK Two Onshore Wind Farms	70	Romania	2012–2014	Lender's engineer; Technical due diligence, Construction monitoring, Operations monitoring
RAIFFEISEN BANK POLSKA S.A. Krzecin Onshore Wind Farm	14	Poland	2008	Lender's engineer, Technical due diligence, Construction supervision
CENTRICA RENEWABLE ENERGY Lincs Offshore Wind Farm	270	UK	2010–...	Risk management (ongoing); HSE Management
WEST LANDESBANK Onshore Wind Farm	-----	Germany	2003–2004	Lender's engineer, Technical due diligence
INVESTKREDIT Onshore Wind Farms	-----	Austria	2006	Technical due diligence, Construction supervision, Final acceptance inspection; Design assessment, Lifetime assessment
MAGUERITE FUND Butendiek Offshore Wind Farm	-----	Germany	2011	Technical due diligence
ING GROUP Waarpolder Wind Farm (19 wind turbines)	-----	Netherlands	2005	Technical due diligence; cost benefit analysis, reliability assessment, condition and remaining lifetime
CEZ ROMANIA Onshore Wind Farm	252	Romania	2009–2010	Technical due diligence and inspections
PLAMBECK NEUE ENERGIEN AG Gode Wind II & III Offshore Wind Farms	320	Germany	2008–...	Project certification – Design, Basis & Site assessment, site specific design of wind turbine and foundation
PEP – POLISH ENERGY PARTNERS Puck, Suwalki, Tychowo, Modlikowice and Lukaszow Onshore Wind Farms	-----	Poland	2005–2009	Owner's engineer, Technical due diligence, Tender support, QHSE Management, Vendor assessment, Manufacturing inspection, Construction supervision, Final acceptance inspection
OCH ZIFF MANAGEMENT LTD	5	Germany	2007	5MW wind turbines technical due diligence, assessment of reliability, maintenance, consequence analysis, cost benefit analyses
VAN OORD BV Q7 offshore windfarm	120	Netherlands	2006–2007	Technical due diligence, Design assessment, Construction supervision, Coating and corrosion inspection, NDT inspections
BELWIND OFFSHORE	165	Belgium	2009–2010	QHSE, works quality control, schedule control, commissioning inspection
EKO ENERGY SP. ZOO. Kobylnica Onshore Wind Farm	41.4	Poland	2010–2011	Owner's engineer, construction supervision
VATENFALL Kriegers Flak Offshore Wind Farm	-----	Sweden	2006–2009	Owners representation, Assembly supervision, Construction supervision, Design assessment, Final inspection, NDT magnetic particle, NDT ultrasonic, QA of material & equipment, Verification/Certification
WE ENERGIES Blue Sky Green Field Onshore Wind Farm	-----	USA	2008	Technical due diligence, Owners representation, Final inspection, Commissioning and startup survey
PLAMBECK EMIRATES Gode Wind II Offshore Wind Farm	-----	Germany	2011	Technical due diligence
ENBW ENERGIE 4 Offshore Wind Farms	-----	Germany	2008	Technical due diligence
PROKON NORD ENERGIE Cote d'Albatre & MEG Offshore Wind Farms	-----	France Germany	2008	Project certification, Manufacturing inspection
ACCIONA WIND POWER Tatanka Onshore Wind Farm	180	USA	2007	Health & Safety consultancy, Inspections to very compliance with OSHA regulations
VENDATA GROUP Samana Onshore Wind Farm	38.4	India	2007	Construction supervision
ENOVA Delta II Offshore Wind Farm	-----	Germany	2009	Project certification
LCO NATURE C/O EVELOP GERMANY Albatros & OWP West Offshore Wind Farms	-----	Germany	2008–2009	Project certification
RWE Rhyl Flat and other Offshore Wind Farms	-----	UK Germany		QHSE consultancy, HSE audits and management
ENEL Onshore Wind Farms	-----	Brazil Spain Italy	2003–2009	Technical due diligence, QA/QC management and inspection
TRIANEL Borkum West II	-----	Germany	2008	Project certification

CLIENT PROJECT	POWER (MW)	LOCATION	YEAR	SERVICES
TAI-POWER Cahngkong Onshore Wind Farm	-----	Taiwan Vietnam Denmark	2005-2007	Construction supervision, Final acceptance inspection, Manufacturing inspections (visual and NDT)
NORTHERN ENERGY Gaia II, Gaia III, Gaia IV, Global Tech II, Global Tech III, Sea Storm I, Sea Storm II, Sea Wind III, Sea Wind IV	-----	Germany	2009	Project certification
GLOBAL TECH I OFFSHORE WIND GMBH Global Tech I Offshore Wind Farm	-----	Germany	2009	Project certification
ELSAM Burbo & Horns Rev Offshore Wind Farms	-----	Belgium	2004-2006	Failure analysis, Coating inspection (monopile, transition pieces, towers, boat landings and platform)
GRUPO ENERSIS Several Onshore Wind Farms	-----	Portugal	2004	Construction supervision
RWE San Basilio Onshore Wind Farm	-----	Italy	2009	QA/QC management and inspection
SENER NOVEM Egmond aan Zee Offshore Wind Farm	-----	Netherlands	2009	Manufacturing inspections
GES – GLOBAL ENERGY SERVICES Mesquite Onshore Wind Farm	-----	USA	2007	Construction supervision
PORT OF DAKAR		Senegal	2012	Consultancy services on Renewable Energy, Energy efficiency audit of the actual assets and buildings, Alternative renewable power (solar and wind) feasibility study, Wind site assessment; Solar site assessment, Financial evaluation of the alternative renewable solutions, CDM evaluation: Project identification (handled by EDEN), Technical feasibility study and procurement support
EDISON MISSION ENERGY Buffalo Bear and Elkhorn Ridge Onshore Wind Farms	-----	USA	2008	Construction supervision, Final acceptance inspections, Commissioning survey
VAN OORD DREDGING Princess Amalia and Bligh Bank Offshore Wind Farms	-----	Belgium Netherlands	2006	Construction supervision, Design verification, NDT inspections, Coating inspections, QA/QC management and inspections
EDP RENOVÁVEIS Onshore Wind Farm	-----	Spain	2009	HSE management
ACCIONA WIND POWER Tatanka Onshore Wind Farm	180	USA	2007	Health & Safety consultancy, Inspections to verify compliance with OSHA regulations
VESTAS Onshore Wind Farms	-----	China India Spain, Germany	2006-2010	HSE management and inspection, NDT inspections, Manufacturing supervision, Construction supervision
SINOVEL WINDTEC Huaneng Weihai, Jilin Tongyu, Beifang Longyuan, Heilongjiang Fujin, Ningxia Ningdong, State Electric Power Xingxeng, Datang Dali Onshore Wind Farms	-----	China	2007-2011	QA inspections, NDT and welding supervision, dimensional check for towers
REPOWER Onshore Wind Farms	-----	Germany Italy China	2007-2010	QA inspections, Construction supervision, H&S coordination
VESTAS North Hoyle Offshore Wind Farm	-----	Belgium	2004-2005	Failure analysis, Coating inspections, Technical assistance for repairs
WINWIND POWER Onshore Wind Farms	-----	India Germany	2008-2010	Tower assembly inspection, Foundations design verification
NORDEX Helashan & Changdao Onshore Wind Farms	-----	China	2006-2010	QA inspections, Dimensional checks, Foundation supervision
NN Onshore Wind Farm	-----	Germany	2008-2010	In-Service inspections, NDT to blades
GENERAL ELECTRIC Padrela, Fonte da Quelha, Alto do Talefe, Lomba de Seixa II, Alagoa de cima, La Fuensanta Onshore Wind Farms	-----	Portugal Spain	2004-2005	Construction supervision, H&S coordination
GAMESA Onshore Wind Farms	-----	USA Spain China	2004-2007	Construction supervision, Material testing, Manufacturing supervision
NORDEX Onshore Wind Farms	-----	China, Germany Portugal, Denmark Spain	2001-2010	Owner's representative, Supplier audits, Expediting, Assembly supervision, NDT, QA inspections, Final acceptance inspections
ENERCON Onshore Wind Farms	-----	Belgium India	2000-2005	Safety coordination, Final acceptance inspection
SIEMENS	-----	Germany	2003-2007	NDT inspections (towers)
MADE TECNOLOGIAS Carcelen & San Juan de Vargas Onshore Wind Farms	-----	Spain	2004-2005	Construction supervision, H&S coordination, Supplier audits, QA inspections, Expediting

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WHEN YOU NEED TO BE SURE

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