



# MARINE RENEWABLE ENERGIES

BOOSTING COMMERCIAL  
VIABILITY



**BUREAU  
VERITAS**

# MARINE RENEWABLE ENERGIES

## SUSTAINABLE SOLUTIONS TO MEET THE 21<sup>ST</sup> CENTURY'S ENERGY NEEDS

With climate change at the top of the global political agenda, governments worldwide are seeking ways to decarbonize their energy supply and reduce emissions. The sea is a potentially limitless source of energy.

Fixed offshore wind is already a mature sector, while other Marine Renewable Energy (MRE) technologies are at a turning point and offer exciting potential. Floating wind solutions are moving towards commercial viability. Meanwhile, the potential of tidal and wave solutions has not yet been fully realized as technologies are only just transitioning from the research phase to commercial use. However, over the next decade, the numbers of tidal turbines, wave energy converters and ocean thermal energy converters are set to rise.

## – SUPPORTING YOUR JOURNEY

Designers and operators of these promising technologies face multiple challenges on the road to developing MRE as an established energy source. To secure funding their technologies, they must prove performance. This is fundamental to attracting investors and ensuring sustainable, profitable commercialization.

MRE developers also need to de-risk their innovative technologies, ensuring safety and quality. This means adopting codes and standards that demonstrate to public authorities, finance providers, insurers, site owners and, ultimately, end users that new asset designs and operations are safe and cost-effective. In a nascent sector for which international standards are still in development, this can prove complex.

## – PROVING YOU CAN DELIVER

Bureau Veritas is playing a key role in the energy transition. Independent certification and inspections from a respected body with extensive experience in renewable energy and marine markets can help the MRE industry move forward safely, speedily and with confidence.

Since existing codes and standards do not completely address the specificities of MRE technology, Bureau Veritas works to develop robust certification schemes and other third-party services that allow cutting-edge technologies to gain acceptance and achieve scale-up.

## – YOUR MARINE RENEWABLE ENERGIES PARTNER

Bureau Veritas is a leading certification body for the fixed and floating wind industries, and we offer expertise across all types of MRE technology. We draw on extensive experience of more established MRE solutions to support emerging sectors that require a forward-thinking partner capable of understanding their challenges and supporting their growth. Our services include the publication of dedicated MRE guidelines and the conferral of Approvals in Principle along with prototype, type, component and project certification. To complement these third-party services, Bureau Veritas Solutions - Marine and Offshore provides consultancy for owners, operators and insurers, aiming to resolve new and complex issues, de-risk projects, and optimize costs. We also offer Marine Warranty Services via our subsidiaries MatthewsDaniel and MAC.

## WHY CHOOSE BUREAU VERITAS?

**As a recognized global leader in testing, inspection and certification, Bureau Veritas is the partner of choice for energy companies in all sectors - from the conventional, such as fossil fuels, to the most pioneering, such as wind and solar.**

Bureau Veritas Marine and Offshore's international network of 2,650 experts offers technical know-how and a thorough knowledge of our clients' needs. Our mission is to help you develop your business safely and sustainably, leveraging expertise acquired over 190 years working with established industries to accelerate the development of those that will shape the future.

Through Bureau Veritas Solutions - Marine and Offshore, we also offer value-added consulting and outsourcing services.

We provide technical advisory, asset management, and assurance solutions for the marine and offshore energy markets.

## PERFORMANCE DEMONSTRATED

**The Bureau Veritas brand:** an internationally recognized mark of confidence

**Industry-leading research,** knowledge and technical expertise

**In-depth knowledge** of industry challenges, opportunities and regulations

**Worldwide network** of qualified experts



# OFFSHORE WIND

## SUPPORTING COMMERCIAL VIABILITY AND OPERATIONS



### Certification for fixed wind solutions

#### – DEMONSTRATE COMPLIANCE TO OPTIMIZE SAFETY AND PERFORMANCE

Bureau Veritas is a leader in the certification of fixed wind projects. We offer certification along the value chain, from components to manufactured converters and offshore farms. The mature technology used for fixed offshore wind farms benefits from its own Bureau Veritas-developed Guide, based on the existing international standard IECRE OD 502 (formerly IEC 61400-22). Compliance with international standards, developed under IEC 61400 series, ensures the safety of your operations and provides valuable proof of their ability to perform.

### Floating prototypes and project certification

#### – VALIDATE SAFETY AND CONFORMITY FROM DESIGN TO INSTALLATION

To support the transition of floating wind from pilot projects to commercial farms, we have developed sector-specific certification in line with IEC guidelines. These include rule notes NI 572 (*Classification and Certification of Floating Offshore Wind Turbines*) and NI 631 (*Certification Scheme for Marine Renewable Energy Technologies*). Prototype certification attests to the structural integrity of units prior to installation, while component and type certification confirm that they conform to design assumptions. Full project certification proves compliance with all national requirements, standards, codes and other site-specific requirements, helping you green light your project.

### Approval in Principle for floating wind solutions

## – SECURE EARLY INVESTMENT TO MOVE PROJECTS FORWARD

Designers working on floating wind energy projects look to Bureau Veritas for third-party validation that their concepts are fit for purpose. Achieving an Approval in Principle (AIP) is imperative to secure financing for a prototype or to pitch technology to a project owner. In validating technology with AIP, Bureau Veritas aims to help the floating wind sector develop to the point where it plays as important a part in the energy transition as its fixed counterpart.

### Research and development

## – ACCESS CUTTING-EDGE THINKING TO DRIVE YOUR INDUSTRY

Bureau Veritas is involved in numerous working groups and research projects, including at EU level. Our participation in groundbreaking work on hydrodynamics, structures, moorings, stability, risk and reliability, and asset integrity management deepens our expertise and broadens our experience. Strengthening our relationships with major players in the sector and playing a key role in developing the latest technologies serves our clients across the board.

### Marine Warranty Services

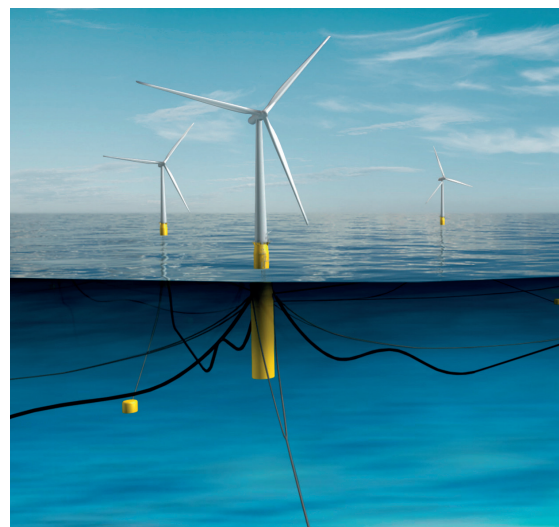
## – MINIMIZE RISK AND AVOID LOSSES

Through specialized Bureau Veritas Group companies MatthewsDaniel and MAC, we offer marine warranty surveying and third-party verification services – essential to reducing the risk of loss or damage in marine renewable energy projects. Our teams identify risk and advise on measures to mitigate and minimize risk. They provide operators and contractors with independent verification of procedures, review technical documentation, and undertake on-site inspections.

### Asset integrity management

## – OPTIMIZE MAINTENANCE VIA A DIGITAL TWIN

Asset Integrity Management helps optimize return on investment throughout the lifetime of your offshore wind farm. Bureau Veritas' Veristar AIM<sup>3D</sup> develops a digital twin of your turbine, which is updated with data throughout the lifecycle. It can be used to establish a risk-based approach to inspection and maintenance.



# EMERGING MARINE RENEWABLE ENERGIES

## A PIONEERING ROLE

All types of Marine Renewable Energies are supported by Bureau Veritas Guidance Note NI 631 (*Certification Schemes for MRE Technologies*). We offer technology developers approval in principle as well as technology qualification, prototype, component, type and project certification. We also lead and contribute with our experience and knowledge to the development of international standards through IEC 62600 working groups for Marine Energy – Wave, Tidal and other water current converters.

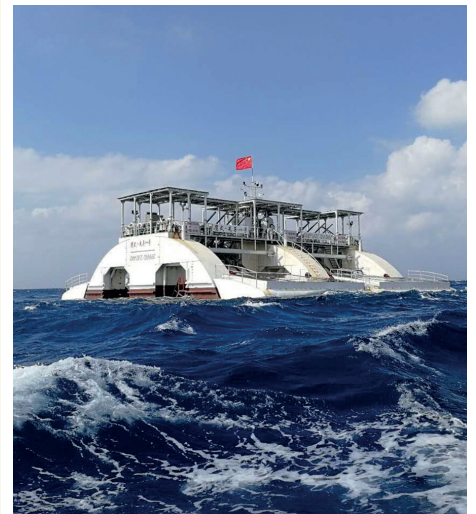


### – RIVER AND TIDAL ENERGY CONVERTERS

Since the turn of the tides is predictable, tidal power has great potential for energy generation. Bureau Veritas has played an important role in its development by contributing to working groups seeking to develop this technology. In addition we have published requirements for current and tidal turbines installed on the seabed, inspired by the IEC 62600 series of technical specifications. This Guidance Note, NI 603 (*Current and Tidal Turbines*), covers support structures, turbines and electrical installations.

### – WAVE ENERGY CONVERTERS

Wave energy converters (WEC) can leverage the energy of wind waves to generate power, pump water and drive water desalination systems. While this technology is still in an experimental phase, Bureau Veritas is helping to take it from the drawing board to the National Grid by participating in research projects and working on AIPs.



### – OTEC AND SWAC

As a continuously available energy source, Ocean Thermal Energy Conversion (OTEC) is currently attracting most attention in the form of Sea Water Air Conditioning (SWAC). Using naturally cool deep-sea waters as a heat sink to drive air conditioning systems, SWAC is particularly useful for large buildings such as hotels and hospitals in tropical zones.

Bureau Veritas is the first certification body to issue an OTEC technology Guidance Note, which is complementary to IEC 62600 series standards and can also be used for SWAC. This is an important first step towards the creation of a certification scheme and a clear demonstration of our commitment to providing support for fledgling MRE - from inception to commercialization.

# BUREAU VERITAS SOLUTIONS - MARINE & OFFSHORE

## MARINE RENEWABLE ENERGY SERVICES

**Bureau Veritas Solutions - Marine and Offshore provides consulting and outsourcing services, such as technical advisory, asset management and assurance solutions, for the shipping and offshore energy markets**

### – OPTIMIZING PERFORMANCE

Through high added-value solutions, we enable clients to resolve new and complex issues, de-risk projects, and optimize costs. By listening to clients and gaining an in-depth understanding of their challenges, Bureau Veritas Solutions advisors apply proven know-how to deliver tangible improvements to assets and business performance, safely and responsibly.

### – MINIMIZING RISK

In an increasingly digital world, we partner with asset owners and operators to go beyond pure compliance and enable their assets to perform at a significantly reduced level of risk. We assess risks using qualitative and quantitative analyses, calculating the severity of risks identified during hazard and risk assessment studies. Using their conclusions, our experts develop cost-effective measures to mitigate and manage offshore-related risks.

### – ENSURING RELIABILITY

In offshore projects, asset failure is the leading cause of production and financial loss. To identify potential causes of production losses, Bureau Veritas Solutions Marine & Offshore uses Reliability, Availability and Maintainability modelling to assess your design-stage production system's effectiveness and suggest improvements. We also perform Reliability-Centered Maintenance analyses to offer you a methodical and coherent decision-making process that achieves the maximum reliability available from a physical asset.

### – DIGITAL ASSET MANAGEMENT

To optimize inspection, maintenance and repair strategies, we have developed Veristar AIM<sup>3D</sup>. Through the creation of an interactive digital twin that follows the lifecycle of your floating and fixed offshore wind turbine, you can reduce downtime and costs, use data to drive planning and decision making, and make data sharing more efficient.





***Move Forward with Confidence***

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