

Innovative and Sustainable Technologies for Rapidly Growing Underwater Markets

As global demand for deep-sea energy, subsea infrastructure, and maritime security continues to accelerate, the subsea technology sector is undergoing a profound transformation. Increasing electrification, digitalization, and autonomy are reshaping how underwater systems are designed and operated. Modern subsea power solutions must not only support more complex and energy-intensive applications but also operate reliably at greater depths, under extreme environmental conditions, and with minimal human intervention. At the same time, operators are under growing pressure to reduce emissions, optimize costs, and improve overall system efficiency.

SubCtech GmbH, headquartered in Kiel, Germany, has established itself as a global leader in advanced underwater energy solutions. As part of the Gabler Group AG, SubCtech leverages decades of engineering expertise and a strong technological foundation in high-performance systems for demanding marine and offshore environments.

The company specializes in subsea power systems, lithium-ion battery technologies, and custom-engineered energy storage solutions. Its approach combines in-house engineering, rigorous validation processes, and close collaboration with customers to deliver highly reliable, application-specific systems. With a steadily growing international presence and expanding production capabilities, SubCtech provides smart, field-tested technologies that reduce CAPEX, OPEX, and CO₂ emissions—delivering measurable value across industrial,

environmental, and defense sectors.

AUVs, Offshore Assets & Ocean Monitoring

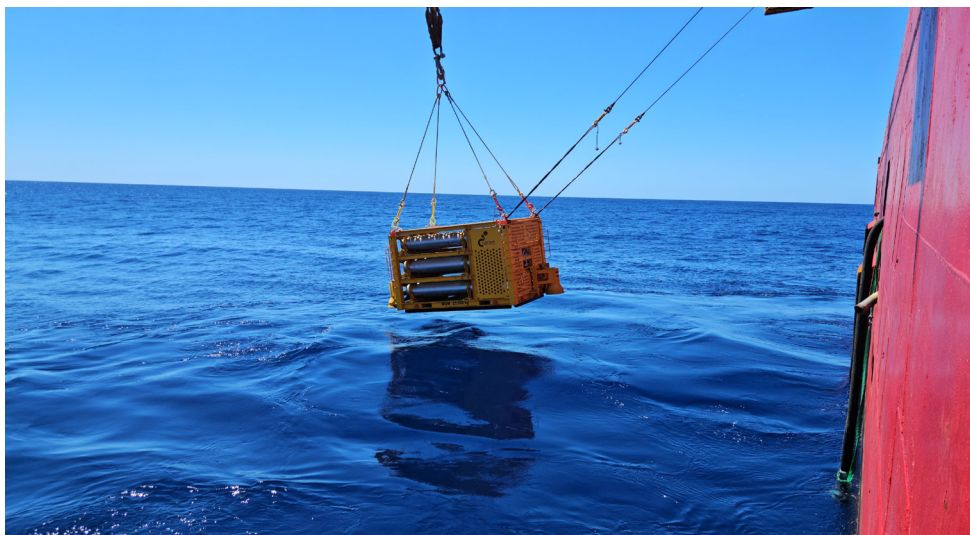
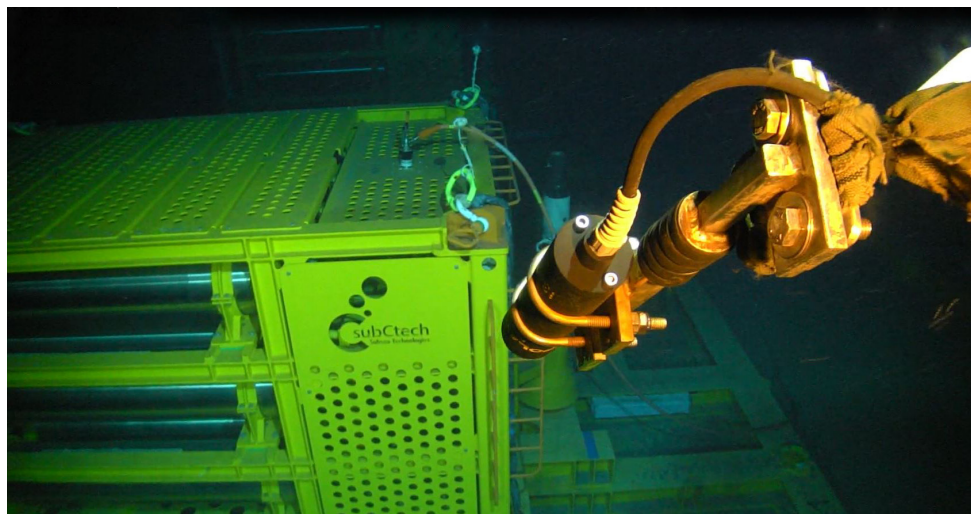
SubCtech's Ocean Power portfolio comprises advanced lithium-ion battery systems and subsea energy storage solutions designed to support a wide range of applications. These include offshore oil and gas operations, carbon capture and storage (CCS)

projects, environmental monitoring systems, and autonomous or remotely operated vehicles such as AUVs, ROVs, and USVs.

At the core of this portfolio is the PowerPacks™ product line—robust, modular battery systems engineered for long-term deployment in subsea environments. With a design life of up to 25 years, these systems provide reliable energy supply for applications ranging from compact sensor platforms to large-scale underwater infrastructure.

A key differentiator of the PowerPacks™ is their adaptability to varying operational requirements. To ensure optimal performance and durability, SubCtech offers multiple pressure-tolerant housing options tailored to specific depth and environmental conditions:

- Titanium housings, enabling ultra-deep deployments down to 6000 meters, where maximum strength-to-weight ratio and



corrosion resistance are critical

- Super-duplex stainless steel housings, combining exceptional mechanical strength with high corrosion resistance for demanding offshore applications
- Marine-grade aluminum housings, providing a cost-efficient solution for operations in shallower waters up to 1000 meters

This flexible design approach allows customers to optimize system configuration based on mission profile, cost considerations, and environmental constraints.

Built for Power, Proven in the Field

Reliability is a fundamental requirement for all subsea systems, where maintenance and intervention are inherently complex and costly. SubCtech therefore places strong emphasis on qualification and validation. All battery systems undergo extensive testing programs designed to simulate real-world operating conditions, including resistance to mechanical shock, vibration, thermal cycling, pressure variations, and electromagnetic interference.

SubCtech's systems are engineered to meet or exceed key international standards, including:

- UN 38.3 for safe transportation of lithium-ion batteries
- API 17F and API 17Q for subsea production system reliability
- MIL-STD and DNV 2.7-3 for offshore transport and operational compliance

The lithium-ion-based PowerPacks™ incorporate advanced safety and protection mechanisms, including safeguards against overvoltage, undervoltage, overcurrent, overheating, overcharging, and short circuits. These features are essential to ensure safe and reliable operation over extended deployment periods.

At the core of each system is the proprietary SmartBMS™ (Battery Management System). This intelligent system continuously monitors critical



parameters at both cell and module level, enabling real-time optimization of performance, state-of-charge balancing, and fault detection. The SmartBMS™ also supports remote diagnostics and data analysis, allowing operators to monitor system health and performance without physical intervention. This capability significantly enhances operational reliability while reducing maintenance requirements and lifecycle costs.

The PowerPacks™ are designed to deliver high peak currents when required, operate reliably in sub-zero temperatures, and maintain stable performance over long deployment periods with minimal degradation. These characteristics make them ideally suited for demanding subsea missions where reliability and endurance are paramount.

Subsea ESS: Powering the Energy Transition

A major innovation milestone for SubCtech is the development of a modular and scalable Subsea Energy Storage System (ESS). This system represents a significant step forward in subsea electrification and plays a key role in enabling the offshore energy transition.

The ESS is among the first systems of its kind to be certified under API 17F and to achieve Technology Readiness Level 6 (TRL 6), demonstrating successful validation under real

offshore deployment conditions. This achievement underlines the system's readiness for commercial application in demanding environments.

The ESS architecture is designed for flexibility, scalability, and reliability. It includes:

- Two 1 MWh Battery Storage Skids (BSS)
- An integrated Power Skid with AC/DC conversion capabilities
- Automated configuration and control via SmartBMS™ and a Battery Control Module (BCM) based on NetDI® technology
- A fully redundant system design ensuring continuous operation even in the event of component failure
- Modular scalability allowing expansion up to 6 MWh capacity

Designed for a service life of up to 25 years, the ESS currently supports deployment depths of up to 2,000 meters, with future upgrades enabling operation at 3,000 meters and potentially up to 6,000 meters. The system has already been successfully deployed in offshore oil and gas projects, where its performance and reliability have led to immediate follow-up orders—demonstrating strong market acceptance.

From AUVs to Infrastructure: Flexible Applications

SubCtech's technology portfolio

supports a wide range of subsea applications across both industrial and defense sectors. The flexibility of its systems allows seamless integration into different platforms and operational concepts.

For large autonomous platforms, SubCtech provides battery solutions for XXL-AUVs used in surveillance, mine detection, and deep-sea intelligence missions. These systems can be configured with up to 12 battery modules of 100 kWh each, delivering total capacities exceeding 1 MWh at voltages of up to 1000 V, with flexible serial or parallel configurations.

For smaller platforms, SubCtech offers standardized battery modules with diameters of 416 mm, 310 mm, and 260 mm, enabling compact and efficient integration into AUVs used for

inspection, monitoring, and survey tasks.

Another key innovation is the enablement of docking-capable AUVs and ROVs, which can autonomously recharge at subsea docking stations. This eliminates the need for costly surface recovery operations and significantly extends mission duration and operational efficiency.

Beyond mobile platforms, the Subsea ESS provides critical infrastructure support by buffering renewable energy sources such as offshore wind, wave, and solar power. It also supplies energy to subsea compression systems, injection units, and monitoring installations, making it a key enabler for decarbonized offshore operations.

Engineering for Efficiency and Sustainability

Efficiency and sustainability are central to SubCtech's engineering philosophy. By enabling long-term autonomous subsea operations, the company's systems significantly reduce the need for vessel-based intervention, which is traditionally one of the largest cost and emission drivers in offshore operations.

The Subsea ESS can replace conventional umbilical systems and reduce the need for extensive cable infrastructure, particularly in long tieback and CCS applications. This not only lowers installation and operational costs but also reduces environmental impact.

The system's redundant architecture ensures uninterrupted power supply to critical subsea loads, enhancing operational safety and reliability. At the same time, advanced telemetry solutions enable wireless underwater communication over distances of up to 6,000 meters using Acoustic Telemetry Modems (ATM), providing real-time data transmission and system monitoring.

Global Growth, Local Expertise

With approximately 90 employees and a planned tripling of production capacity by 2026, SubCtech is well positioned to meet increasing global demand for subsea energy solutions. Despite its rapid growth, the company remains committed to maintaining high quality standards, engineering excellence, and customer focus.

All battery systems are UN-certified for transport, including airfreight, ensuring efficient and flexible global logistics. Supported by an experienced international sales and service network, SubCtech delivers reliable and scalable solutions to customers worldwide.

"Our mission is to provide sustainable technologies for the marine environment," says COO Sören Johannsen. "With our proven battery and ESS platforms, we are enabling the energy transition while supporting critical subsea operations around the world."

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