

riffgat

OFFSHORE-WINDPARK



Reference solution

**Fire protection
for offshore
wind farm
TITANUS®
FirExting®
OxyReduct®**

A comprehensive fire protection concept keeps the transformer substation safe at the Riffgat wind farm

WAGNER® 

THE CUSTOMER

A comprehensive fire protection concept safeguards the transformer substation from fire risks at the Riffgat wind farm, located 15 km north-west of Borkum.



The platform is prepared for the installation of a wind turbine



Equipped with fire protection technology WAGNER:
The transformer substation at the Riffgat wind farm

Providing climate-friendly power since February 2014: the 30 wind turbines at the Riffgat offshore wind farm. At its heart is the 36 m tall transformer substation, which contains all the technical equipment – as well as a state-of-the-art fire protection solution.

Located 15 km north-west from the island of Borkum, the wind farm (a joint project between the Oldenburg-based energy and telecommunications company EWE and the ENOVA Group) gets its name from the shipping route of the same name in the southern

North Sea, the “gateway to the reef.” Costing € 450 million, the facility with an output of 108 MW supplies roughly 120,000 households with climate-friendly power. For this purpose, 30 Siemens SWT-2.6-120 wind power plants with an output of 3.6 MW each and a height of 150 m were erected on a surface of roughly 6 km².

A cable connection of roughly 80 km and 155 kV, known as the export line, ultimately delivers the power from the electrical substation on the generating side to the transformer substation on the mainland, from which the power

can be fed into the German 220 kV grid. The project engineers from the ENOVA Group came upon WAGNER while searching for a partner to establish and implement a fire protection concept: “The fact that we offer a broad spectrum of products ranging from highly sensitive fire detection and gas extinguishing systems to fire prevention, combined with decades of experience along with it, quickly persuaded EWE and ENOVA,” says Michael Kind, Head of the WAGNER Group’s Hamburg/Hanover branch office.

THE RISK ANALYSIS

Ensure fire protection in places where fire fighters can't reach: The remote island location poses a special challenge.

An offshore wind farm forms a closed power supply system in the middle of the sea. In order to channel the energy generated by the individual wind turbines and feed it to the transformer substation at sea, all of the wind farm's turbines must be connected to one another via sea cable. In total, nearly 25 km of sea cable in various power levels was laid for data transmission and control of the Riffgat turbines, which all ultimately converge at the transformer substation.

The transformer substation is thus the central hub of the entire offshore facility. A severe malfunction or even a fault would bring the wind park's production to a complete standstill. Accordingly, maintaining the functioning of the transformer substation was given very high priority in project planning.

The control rooms, air conditioning equipment and batteries constitute the main risk of fire breaking out due to the great number of various electrical components they contain. Such areas place special requirements on fire detection in terms of detection sensibility, making conventional point-type detectors unsuitable for the various room conditions. And if worst comes to worst, extinguishing water and foam

cannot be used in these areas, because they require the transformer substation to be shut down.

"We provided the complete fire prevention solution for the Riffgat wind farm power transformer substation. This has the tremendous advantage that everything really is optimally co-ordinated. You cannot take a chance that

could damage or destroy a multi-million Euro project like Riffgat in the event of a malfunction," says Dipl.-Ing. Michael Kind.



THE PROTECTION OBJECTIVE

The following protection objectives were defined in the project planning for the transformer substation:

■ **Prevent fires from breaking out or spreading in order to minimise the level of damage**

■ **Ensure smooth operation without having to shut down the power to the system**

■ **Prevent false alarms and unnecessary interruptions which could disrupt the wind farm's power production**

THE SOLUTION

All-round protection featuring very early smoke detection, fire prevention, extinguishing technology and a fire risk management system.

Detection, quick release and maintenance – the fire protection concept in a nutshell

At the heart of the fire protection installation is the TITANUS® air sampling smoke detection system. A total of 34 units of the very early smoke detection system were installed in the various sectors to continuously sample the interior air. The TITANUS® optical detector has especially high sensitivity and reacts significantly faster than conventional point-type detectors – and there are no false alarms in the process. If a fire is detected, FirExting® gas extinguishing technology uses nitrogen to reduce the oxygen content in the room to 13.8 % vol. This takes away the fire's supply of oxygen, suffocating it. A total of roughly 400 kg of nitrogen is kept on hand at the transformer substation in 140 l cylinders to perform the quick release.

Since an extinguishing system can only extinguish for a certain period of time and the extinguishing agent will have to be replaced for the next use, the OxyReduct® fire prevention system is installation in addition to offset this circumstance. In order to prevent a fire from smouldering on or reigniting after the gas extinguishing system conducts its quick release, the OxyReduct®

fire prevention system maintains the reduced oxygen content at a low level until the risk of the fire re-emerging can be ruled out. Since the system can extract the nitrogen required for this purpose from the room's air on its own using membrane technology, the low oxygen level in the protected area can be maintained as long as necessary – even over multiple days in the event of an emergency.

This means that areas equipped with the system, like control rooms, air-conditioning equipment and batteries, can be reliably protected from fire damage.

Continuous monitoring from the mainland

In order to ensure that no incident at the transformer substation goes unnoticed, all fire prevention equipment is integrated into the VisuLAN® risk management system. All messages from the TITANUS® air sampling smoke detectors, such as alert alarms, pre-alarms and main alarms in dual detector dependency are recorded here and trigger specific actions defined ahead of time. The alert from the info alarm, for example, is triggered distinctly before the main alarm goes off. The personnel on the mainland are thereby



400 kg of nitrogen in cylinders for quick release in ten areas with areas between 10 and 100 m²

informed at an early stage, before a fire can even cause malfunctions. This is a valuable time advantage in serious situations. In addition, the system records all incidents arising in connection with the fire prevention system. This means that VisuLAN® can also provide valuable information in the aftermath of a fire.

SYSTEM OVERVIEW

AIR SAMPLING SMOKE DETECTOR



TITANUS®

- Maximum sensitivity for earliest possible fire detection
- Dual detector dependency
- False alarm-proof

OXYGEN REDUCTION



OxyReduct®

- generates nitrogen on-site directly from the ambient air
- keeps the oxygen concentration at a constantly low level
- reduces the risk of fire breaking out and limits the spreading of a fire

GAS EXTINGUISHING



FirExting® with nitrogen

- for quick release in protected area
- The inert gas nitrogen is distributed homogeneously
- extinguishes the fire effectively without leaving any residue behind

RISK MANAGEMENT SYSTEM



VisuLAN®

- monitors the networked fire protection systems
- enables reliable remote monitoring and diagnosis
- provides a valuable time advantage in emergencies with an overview and defined courses of action

“A FINELY TUNED SOLUTION”



An interview with Michael Kind, Head of the WAGNER Group's Hamburg/Hanover branch office

What were the special challenges in planning the fire prevention system?

Offshore wind parks are unmanned. Complicated accessibility made it necessary to provide fire prevention solutions that will work regardless of when the emergency teams arrive. The emphasis of the planning was on safeguarding the operation without having to shut down the system. Therefore the solution was fire prevention – in combination with different systems co-ordinated with each other to provide all-round protection.

What's special about this concept?

Standard fire prevention solutions only include basic equipment. A finely tuned solution was therefore implemented, combining early smoke detection, fire prevention, gas extinguishing technology, sprinkler and foam extinguishing systems – all continuously monitored from a hazard management system on the mainland. The project made almost exclusive use of WAGNER's own products.

What distinct advantages are provided with oxygen reduction by means of OxyReduct®?

OxyReduct® offers the major advantage that a protective atmosphere can be created with the controlled supply of nitrogen, which effectively protects complete areas against the effects of a fire. This makes it possible to maintain the reduced oxygen level indefinitely, because the nitrogen is extracted from the room's air. In the Riffgat offshore wind park, OxyReduct® is intended to ensure that fire prevention can be maintained after a gas extinguishing system has been triggered until the emergency teams have arrived on site. And that may take a while, depending on the circumstances.

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WAGNER sets standards in fire protection – with innovative and comprehensive solutions

Fire detection and alarm systems

Very early fire detection systems (TITANUS®)

Active fire prevention (OxyReduct®)

Fire extinguishing (FirExting®)

Hazard management (VisuLAN®)

BETTER SOLUTIONS IN FIRE PROTECTION

WAGNER®