

# PROJECT SHEET

**ZAFIRO PRODUCER**  
MOORING REPLACEMENT PROJECT PHASE 2

## BOSKALIS ENERGY SOLUTIONS

Boskalis is a leading global dredging and marine expert. With safety as our core value we provide innovative, sustainable and all-round solutions for our clients in the energy market. Realizing projects in remote locations with a heightened environmental focus is one of our specialties. Under brands such as Boskalis, Dockwise, SMIT, Fairmount, VBMS and Smit Lamnalco we offer more services than any other company in our industry, making us your next one-stop solution provider.

We support the development, construction, maintenance and decommissioning of oil and gas import and export facilities, fixed and floating exploration and drilling facilities, pipelines and cables, and offshore wind farms.

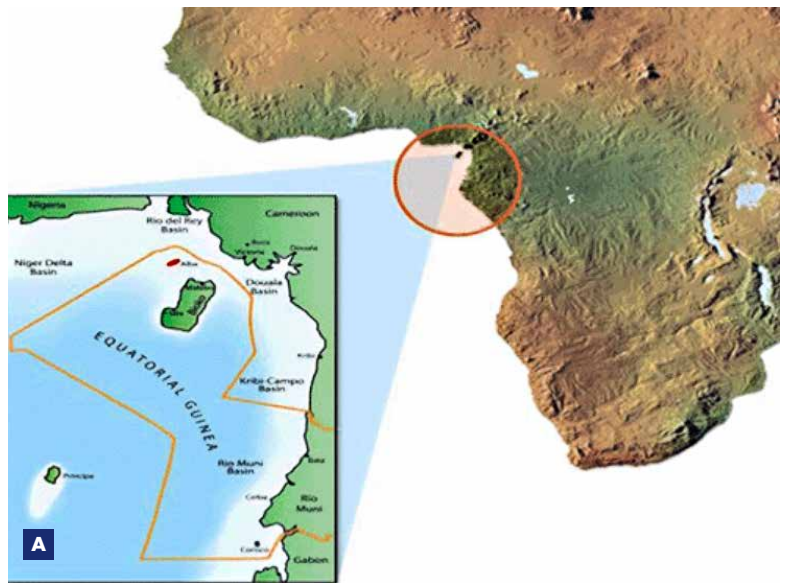
## ZAFIRO PRODUCER

The Zafiro oil field is located in the 500,000-acre Block B, 68 km (42 miles) WNW of Bioko island, Equatorial Guinea, adjacent to the international border with Nigeria. Water depths range from less than 300 ft to greater than 5,000 ft.

The Zafiro-1 discovery well was drilled in February 1995, testing at 10,400 barrels per day (b/d). Three subsequent wells showed the reservoir to be relatively shallow (around 5,000 ft), and low pressure, with a bottom-hole shut-in pressure of 2,800 psig. The Zafiro Producer is a converted 268,191 dwt VLCC (very large crude carrier). The tanker was built in 1973, with an overall length of 331.5 m, a breadth of 56 m and a depth of 26.4 m. It has a draught of 20.5 m fully loaded, or 8.3 m ballasted. Early reservoir evaluation indicated

## FEATURES

Company	Mobil Equatorial Guinea Inc. (MEGI)
Location	Offshore Bioko Island, Equatorial Guinea
Period	Preparation October 2014 – February 2015 Execution February 2015 – March 2015
Contractor	Boskalis Offshore Marine Contracting



- A** Location map
- B** Crew preparing chain for inspection with Zafiro Producer in the background
- C** View from AHTS vessel on FPSO Zafiro Producer



that a 40,000 b/d rate could be expected from the planned eight wells, requiring the installation of an 80,000 b/d process plant, a 40 MMSCFD gas flare capacity and storage for 1.7 MMBBL of oil.

The FPSO was installed in 1996 and later the storage capacity was taken over by the Serpentina changing the Zafiro Producer into a FPU (Floating Production Unit).

Mobil Equatorial Guinea Incorporated, an affiliate of ExxonMobil, entered into a contract with Boskalis for the Zafiro Producer Mooring Replacement Project Phase 2.

### MOORING REPLACEMENT

Boskalis subcontracted InterMoor Incorporated (InterMoor) for a part of the work for the Phase 2 replacement of the Zafiro Producer mooring lines. The Zafiro Producer is installed in 180 m (590 ft) water depth approximately 74 km (40 nautical miles) west of Malabo, Equatorial Guinea.

The mooring system for the Zafiro Producer FPU consists of 12 catenary mooring lines (ML), clustered in four groups of three. The FPU was installed in 1996 with various mooring components replaced in 2000 and additional components replaced in 2013. This 2015 campaign concluded a partial mooring replacement for ML 1, 2, 4, 8, 9, 10, 11 and 12 as well as a complete mooring replacement for ML 3.

The project scope of the Phase 2 mooring replacement consisted of the following:

- Installation of two new anchors utilizing a reaction anchor for tensioning;
- Inspection of specified mooring components;
- Change out of most, if not all, components for a full replacement of two of the mooring lines;
- Change out of specified components for a partial replacement of seven of the mooring lines;
- Removal of samples for forensic analysis.

During operations the hindrance to the Zafiro Producer had to be kept to a minimum as meanwhile production continued. The tropical weather conditions were another challenge for the project team.

However, as recognized by all parties, the main challenge during the project was to align all different people from various backgrounds into one single project team. Already early, during the preparation and engineering phase, the Boskalis and InterMoor project teams worked together as one integrated team, later on expanded with personnel from other



subcontractors.

Despite above challenges, the integrated Boskalis/InterMoor team managed to successfully complete the mooring operations.

### SAFETY

Safety is the first priority during the execution of a project. The Boskalis NINA (No Injuries No Accidents) program was implemented in all facets of the project and adopted by the client and all subcontractors (InterMoor, Olympic, IKM and Vryhof). All personnel involved in the operations were trained and inducted in the NINA program resulting in a high level of safety awareness and commitment. The project was carried out without incidents or accidents.

### CONCLUSION

All risks were well mitigated and all objectives related to the implementation of the NINA program were realized. Thanks to the flexibility of all parties involved the project was successfully executed, with all mooring components replaced in time and to the client's full satisfaction.



**D** NINA banner on board the Zafiro Producer showing the integrated safety program

**E** Water blasting of chains with Jade Platform in the background

Royal Boskalis Westminster N.V.  
PO Box 43  
3350 AA Papendrecht  
The Netherlands  
T +31 78 69 69 000  
F +31 78 69 69 555  
royal@boskalis.com  
www.boskalis.com