LEVEL OF REDUCTION AND OTHER GHG MATTERS

Information related to a system to reduce fuel consumption by using wind power

Submitted by Germany

SUMMARY

Executive summary: This document provides information about the first voyage and results of MV Beluga SkySails

Strategic direction: 7.3

High-level action: 7.3.1

Planned output: 7.3.1.3

Action to be taken: Paragraph 5

Related documents: MEPC/Circ.471; MEPC 57/4/22 and MEPC 57/WP.8

Introduction

1 With regard to the discussion at MEPC 57 on the reduction of greenhouse gas emissions from ships, it is also deemed necessary to look for alternative and hybrid drives. Germany has undertaken at MEPC 57 (see MEPC 57/WP.8, paragraph 3.7) to prepare an information document showing the outcome of trials using wind power.

2 In Germany, efforts have been made to assess the possibilities to use wind power in shipping. One of the most advanced projects is the “SkySails“-system as a hybrid drive.

3 The “SkySails“-System was installed for the first time on a multipurpose heavy lift project carrier that recently returned from her maiden voyages. The results of the first voyage indicate positive effects on the fuel consumption and the CO₂ emissions of the ship.

4 Germany informs about the results of the first commercial application of the “SkySails“-System.
Action requested of the Intersessional Meeting

5 The Intersessional Meeting is invited to take note of the information provided in this document.
ANNEX

First experiences with MV Beluga SkySails:

The 10,000 tdw multipurpose heavy lift project carrier MV Beluga SkySails returned from her successful maiden voyage on the 14th of March. The vessel, loaded with modules for a chipboard plant, set sail from her homeport in Bremen on 22nd January 2008, and travelled about 12,000 sea miles to Guanta (Venezuela), Davant (USA), Mo-I-Rana and Holla (both Norway), where the premiere voyage of a newly built vessel with auxiliary towing kite propulsion was sealed. Thereafter MV Beluga SkySails, operating in tramp shipping business, called at the port of Aviles (Spain) to load wind mill equipment. Pulling out on 29th of March 2008 the vessel again set sail towards the USA to enter the port of Fairless Hills on 9th of April 2008. The carrier has returned to Europe in the beginning of May with Trieste (Italy) as port of destination.

Many sea trials and the first experiences gained throughout the maiden voyage provide good reason to believe in the overall usability and even more efficient performances once the calibrating and adjusting period is completed. The first flights of an initial 160 square metres large kite demonstrated how this propulsion system is able to substitute for up to 15 per cent of the engine’s power. Under perfect conditions during the maiden voyage, even better results with 20 per cent fuel savings could be achieved.

The initial focus during the first half of what is set to be an approximately twelve months long pilot testing phase aboard MV Beluga SkySails is on calibration work and adjustments in order to stabilize the towing kite propulsion. In the second half the flight times will be extended and the general performance of the towing kite system perfected.

Generally, the SkySails-system represents a suitable model for cutting costs and emissions with particular regard to standard heavy lift shipping by usage of wind energy: no bothersome mast on deck, no restriction of stowage space, no hindrances to loading and discharging and no risk to the crew, the cargo or the ship. This, too, has been verified during the maiden voyage.

First results with MV Beluga SkySails:

On the first transatlantic passage until the arrival in Guanta, Venezuela, the kite could be launched for testing over periods ranging from a few minutes to several hours. The call at Guanta right on time displayed that the application of the SkySails-system does not cause any disturbance to the operating schedule of the vessel. However, handling procedures still have to be fine-tuned.

An overview of some outstanding results and findings gained so far substantiates the optimism as well as it underpins the expectation with regard to the functionalism of the towing kite propulsion: On 9th of February, the kite flew from 2 p.m. to 7 p.m. at wind forces of four Beaufort, the vessel’s speed at that time was 15 knots, five to eight tons propulsive force as well as a lowering in bunker consumption of half a ton counting for this five hours have been registered. The vessel retained 15 knots service speed while the diesel engine output was reduced by 20 per cent. Two days later, the previous testing results were verified again. The kite flew for nine subsequent hours, with measured propulsion forces of six to eight tons and a bunker reduction of two tons. On the 12th of February, it was tested how the vessel reacts to a total shutdown of the machine power. Then, the kite produced enough propulsion force to enable the vessel to drive with four knots and on a comparably controlled course instead of floating as
would be usual without kite when the machinery is stopped. On the 26th of February, with wind forces strength seven Beaufort this time, the former results again could be confirmed: the kite was operating for eight hours, six to nine tons of propulsion forces were produced while nearly 20 per cent of the engine’s output was saved.

During the following days, when the vessel returned to Europe on course east-northeast on the northern Atlantic, six to eight metres general swell with waves in peaks mounting as high as 16 metres, several cyclones and thunderstorms prevented the crew from starting the towing kite system. Later, wind forces of eleven Beaufort in the English Channel did not allow for application either. The adversarial weather has proven to be constant even when the vessel again set sail from Spain towards America at the end of March on board.

**Usability of the SkySails-system on the high seas:**

Certain basic parameters have to be fulfilled for enabling the kite to fly in up to 300 metres height. Wind forces between four and eight Beaufort seem ideal to launch the 160 square metres large towing kite while high propulsion can be achieved on courses from 70 degrees onwards with an optimum realized between 120 and 140 degrees. Due to the double cover profile the kite has advantageous aero-dynamic characteristics. Unlike conventional sailing systems, which fit the sail to a mast and in this way connect it to the ship, the towing kite system is connected to the ship via a flexible towing rope only. Hence, the heeling effect is almost totally eliminated, which enhances the safety on the High Seas. The central steering unit operates similar to piloting a paraglide. It pulls to the left and right of the control chords. The aerodynamic profile of the towing kite is thereby modified and has an impact on the flight path. The high-strength and weatherproof textiles allow for an operation of the kite at rain, too. Yet, apart from legal restrictions as the three-mile territorial limit, it is sometimes bad weather that can disallow the application of the system. In these cases, a multi-level safety system and other components guarantee the highest possible safety during operation of the SkySails propulsion. Thunderstorms, for instance, are detected well in advance so that a flying kite could be recovered in time or is not being launched in the first place.

**Crew performance on board MV Beluga SkySails:**

The first commercial voyages of **MV Beluga SkySails** serve as training camps on the High Seas for the entire team involved. The Beluga-crew and the SkySails-engineers on board are focussed on adjusting and calibrating the towing kite system including autopilot in accordance with the vessel’s movements. Thus, regular full-day applications shall soon be made possible and safe, even within the diverse and rough weather conditions as they commonly occur on the ocean. Within the WINTECC-project (wind propulsion technology for cargo vessels, project number: LIFE06 ENV/D/000479), which is co-funded by the European Union, the current time is referred to as being “Phase 3: Demonstration Voyages and Measurements”. This third of a total of five phases concentrates on organizing and undertaking various demonstration voyages during regular operation in order to test the feasibility, durability, profitability and reliability of the towing kite system. The objective is to collect viable data for the calculation of energy savings and greenhouse gas reduction. Another important goal of this phase is to detect, measure, and record the sea state surroundings of the cargo ship as well as the ship’s movements obtained by motion sensors over the entire measurement time period. By comparing these different data sets the influence of the kite system on the ship’s movements can be evaluated.
All first voyages are toughness and endurance tests for the interaction of the SkySails-system and the multipurpose heavy lift project carrier. The crew performance mirrors high motivation and professionalism. Whenever possible, the kite is launched. For the time being it is testing, adjusting, calibrating and fine-tuning which entails that one is yet not able to exploit the savings potential optimally, despite all effort. But later handling is a question of routine. Not only the crew is inspired since everyone is convinced of the necessity of finding a way out of the direct dependence on the rising oil price and SkySails obviously offering such a way, but the seafarers also will benefit from the positive results of operating MV Beluga SkySails. Beluga Shipping will be giving part of the realized savings directly to the crew as an incentive. Aiming at a drop in bunker costs of approximately 2,000 US Dollars per operating day, 20 per cent are remitted to the crew of MV Beluga SkySails.

**Future perspectives for MV Beluga SkySails:**

During the coming months the kite as installed on MV Beluga SkySails will be scaled up to 320 square metres in size to further enhance the efficiency of the innovative towing kite system. Then, WINTECC-phases four and five will be accomplished. The fourth phase focuses on analysing and summarizing of the results of the demonstration voyages. During this phase the energy-savings and CO₂-reductions will be calculated. Furthermore profitability and possible influences between hull and kite system as well as effects on specific environmental parameters will be analysed. The fifth and final phase deals with the dissemination programme. It should deliver the evidence that the towing kite technology functions under different conditions with regard to loading, weather and temperatures. The dissemination of the functionality of the kite technology within this project is therefore essential for market entry. A further objective is to bring the technology into scientific discussion in order to realize possible optimization potential and to transfer technology parts to other industry sectors.

From a commercial perspective of Beluga Shipping GmbH, the rising stream of goods leading from Europe to Central America and from North America to Europe shall be made use of, so that accordingly circular voyages of MV Beluga SkySails should pay off. Due to the evident wind potentials the Atlantic Ocean offers, during the months to come the vessel will mostly be operating on transatlantic-voyages in tramp-shipping-business. Consequently, departing from Europe MV Beluga SkySails heads westwards thereby using the easterly winds on a course south of the Azores. On the return on a northern route from North America course east-northeast the vessel utilizes the strong and steady west winds as they prevail on the Northern Atlantic. In addition, the Pacific Ocean as well as routes from the Far East towards the American west coast bear considerable potentials, which in future are also going to be exploited through shipments with MV Beluga SkySails across the Pacific Ocean.

**Further plans with the SkySails-system:**

Currently 55 multipurpose heavy lift project carriers with up to 17,000 tdw and onboard crane gear that can independently lift up to 700 tons in tandem usage are crossing the oceans. Those facilities will be exceeded by the new Beluga P1-/P2-series currently under construction and due to be delivered as from late 2008 till mid 2011. These state-of-the-art vessels will offer stowage capacities of 20,000 tdw, hatches which measure 86.65 x 18.50 metres at the most, ice class E3 that for two or three months per year probably allows them to travel the north-east-passage from and to the Far-East, moderate bunker consumption and one of the most capable onboard crane
gears in the business: 2x700 tons, combined 1400 tons plus 1x120 tons. On two of these vessels, the SkySails-system will be installed as well.

On the P-series vessels the kites will provide for sail surfaces of 600 square metres each. On this basis, fuel savings in the dimension of up to ten tons daily can be anticipated according to present-day estimates, corresponding to a reduction in ship voyage expenses of more than 6,000 US Dollars and a significant lowering emissions of greenhouse gases.

Beluga Shipping gladly provides further information.

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