

ANALISIS ENERGI DAN BIAYA OPERASI BAHAN BAKAR METANOL PADA KAPAL *OIL CHEMICAL TANKER 4000 DWT*

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ABSTRAK

Organisasi Maritim Internasional (IMO) telah memperkenalkan regulasi bahwa industri perkapalan harus menurunkan Emisi Gas Rumah Kaca setidaknya sebesar 50% di tahun 2050 dibandingkan tahun 2008. Di waktu yang bersamaan, IMO memprediksi Emisi Pelayaran Kapal di dunia meningkat sampai 250% di tahun 2050. Oleh karenanya, Industri Perkapalan perlu membenahi permasalahan ini dengan mereduksi emisi karbon. Pemilihan Bahan Bakar Metanol pada kapal merupakan bahan bakar alternatif kapal yang hemat biaya, rendah emisi, ramah lingkungan, dan terbaharukan. Metanol dapat mereduksi emisi SO_x hingga 99%, emisi NO_x hingga 60%, dan Partikulat Khusus sampai dengan 95%. Tujuan penelitian ini adalah menganalisis ketersediaan bahan bakar Metanol di dunia perkapalan dikaitkan dengan peraturan keamanan untuk kapal berbahan bakar Metanol, melakukan penyesuaian mesin utama berbahan bakar metanol, melakukan perhitungan energi, biaya operasi, harga *retrofit* mesin utama, dan periode pengembalian pada kapal *Oil Chemical Tanker 4000 DWT* dengan metode Pelayaran Pulang Pergi dengan Variasi Rute, Komposisi, dan Harga Bahan Bakar. Dari pembahasan penelitian ini, dapat disimpulkan bahwa hasil perhitungan energi, biaya operasi, dan harga *retrofit* pada kapal *Oil Chemical Tanker 4000 DWT* dengan pelayaran rute Amerika sebesar 3,467,320 MJ, Rp. 1,565,684,341.-, dan 2.4 tahun periode pengembalian, rute Eropa sebesar 3,137,099 MJ, Rp. 1,352,844,897.-, dan 2.8 tahun periode pengembalian, dan rute Asia Pasifik sebesar 3,274,914 MJ, Rp. 1,069,629,506.-, dan 3.5 tahun periode pengembalian, serta harga *retrofit* mesin utama yang mencapai Rp. 7,574,435,035.-.

Kata Kunci : Metanol, Emisi, dan *Oil Chemical Tanker 4000 DWT*

**ENERGY ANALYSIS AND OPERATING COSTS OF
METHANOL FUEL ON 4000 DWT
OIL CHEMICAL TANKER VESSEL**

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ABSTRACT

The International Maritime Organization (IMO) has introduced regulations that the shipping industry must reduce Greenhouse Gas Emissions by at least 50% by 2050 compared to 2008. At the same time, IMO predicts that shipping emissions in the world will increase by 250% by 2050. Therefore, the shipping industry needs to fix this problem by reducing carbon emissions. The selection of Methanol Fuel on ships is an alternative fuel for ships that is cost-effective, low emission, environmentally friendly, and renewable. Methanol can reduce SO_x emissions by up to 99%, NO_x emissions by up to 60%, and Particular Matters by up to 95%. The purpose of this study is to analyze the availability of Methanol fuel in the shipping world associated with safety regulations for Methanol-fueled ships, make adjustments to the main methanol-fueled engine, calculate energy and operating costs on 4000 DWT Oil Chemical Tanker ships with the One Trip Voyage method with Route Variations, Composition, and Fuel Cost. From the discussion of this study, it can be concluded that the results of energy calculations, operating costs, and retrofit prices on the 4000 DWT Oil Chemical Tanker ship with American route shipping amounted to 3,467,320 MJ, Rp. 1,565,684,341. -, and 2.4-years payback period, European routes amounted to 3,137,099 MJ, Rp. 1,352,844,897. -, and 2.8-years payback period, and Asia Pacific routes amounting to 3,274,914 MJ, Rp. 1,069,629,506. -, and 3.5-years payback period, as well as the main engine retrofit price reaching Rp. 7,574,435,035.-.

Keyword : Methanol, Emissions, and Oil Chemical Tanker 4000 DWT