THESIS:

IMPLEMENTATION OF COLD IRONING IN MODERN PORTS

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Case Study of Cargo Vessels

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ABSTRACT

As the world's population continues to grow, low-cost and efficient maritime transport has an essential role to play in growth and sustainable development. Over the last decades, all parties involved in the maritime industry have made combined efforts in order to attain an acceptable environmental performance in the maritime transport supply chain.

Cold ironing is considered as a prime strategy towards decarbonatization and clean shipping. Current thesis indicates the key role, cold ironing could have not only for shipping industry but also for countries and societies as well.

In current thesis, we focus in the application of cold ironing in merchant vessels, which are the backbone of industry given that there are more than 50.000 sea-going vessels.

Key Words: Cold Ironing, AMP, Onshore Power Supply, OPS, Cargo Vessels, Merchant Fleet, Commercial Vessels, Shore side Electricity, GHG Reduction, NTUA.

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1.1 INTRODUCTION & DEFINITIONS

1.1 DEFINITION

Cold ironing or shore connection, or shore-to-ship power (SSP) or alternative maritime power (AMP) is the process where a shore side electrical power is provided to seagoing vessels, allowing them to show down their auxiliary diesel generators while they are at dock.

Operating vessels either at port or during their trips they need electrical power to cover essential functions such as lighting, heating/cooling, accommodation activities and various machinery/equipment (pumps, exchangers, navigation equipment, controlling equipment, PC, etc.).

While at sea, electrical power needed is covered by the use of auxiliary diesel generators which are producing electrical power which via transformers and cable system is distributed.

Same is followed during vessels berthing. Merchant vessels are continuously running their engines, generating pollution, to power functions contributing to air pollution by generating NO_x, SO_x, CO_2 and creating noise vibration and fuel consumption.

Required power could be alternatively provided by following sources:

- Port city's own power grid.
- In-port power plants.
- Renewable energy sources.

1.2 NECECITY TO APPLY COLD IRONING

Maritime shipping is considered the most fuel-efficient mode of transport in ton-miles term and account for 90% of international transport. However, the sector has seen increasing pressure, though new regulations, to improve its environmental performance, particularly in light of its contribution to harmful pollutant emissions on human health.

1.2.1 Environmental Issues

IMO has recently published (December 2020) the fourth IMO Greenhouse Gas Study which is the first IMO greenhouse gas study published since the adoption in April 2018 of the Initial IMO Strategy on reduction of GHG emissions from ships. The Fourth IMO GHG Study 2020 was approved by the Marine Environment Protection Committee at its seventy-fifth session

in November 2020. It contains an overview of GHG emissions from shipping 2012-2018, developments in carbon intensity and emission projections towards 2050.

The most recent estimates included in this Fourth IMO GHG Study 2020 show that GHG emissions of total shipping have increased from 977 million tons in 2012 to 1,076 million tons in 2018 (9.6% increase) mostly due to a continuous increase of global maritime trade. The share of shipping emissions in global anthropogenic GHG emissions has increased from 2.76% in 2012 to 2.89% in 2018. Maritime industry accounts for 5-8% of the global SOx and 15% of NOx emissions.

Cargo vessel leaving the port

Year	Global anthropogenic CO_2 emissions	Total shipping CO^2
2012	34,793	962
2013	34,959	957
2014	35,225	964
2015	35,239	991
2016	35,380	1,026
2017	35,810	1,064
2018	36,573	1,056

Total Shipping and voyage-based and vessel based international shipping CO_2 emissions 2012-2018(million tons)-according to IMO 4th GHG study

1.2.2 Social Issues

Maritime transport is still the backbone of global transport over the entire world due to its large trade volume (big ships) and low unit transportation cost. Around 80 percent of global trade by volume and over 70 percent of global trade by value are carried by sea and are handled by ports worldwide. However, it is also a major contributor to air pollution significantly to coastal areas. Taking into account that approximately 65-70% of ship's emissions are occurring in a range of 0-400km from coast, vessels are responsible, among others, for the pollution of coastal areas and residential zones in many cases.

Photo of vessel at UK port during cargo operation.

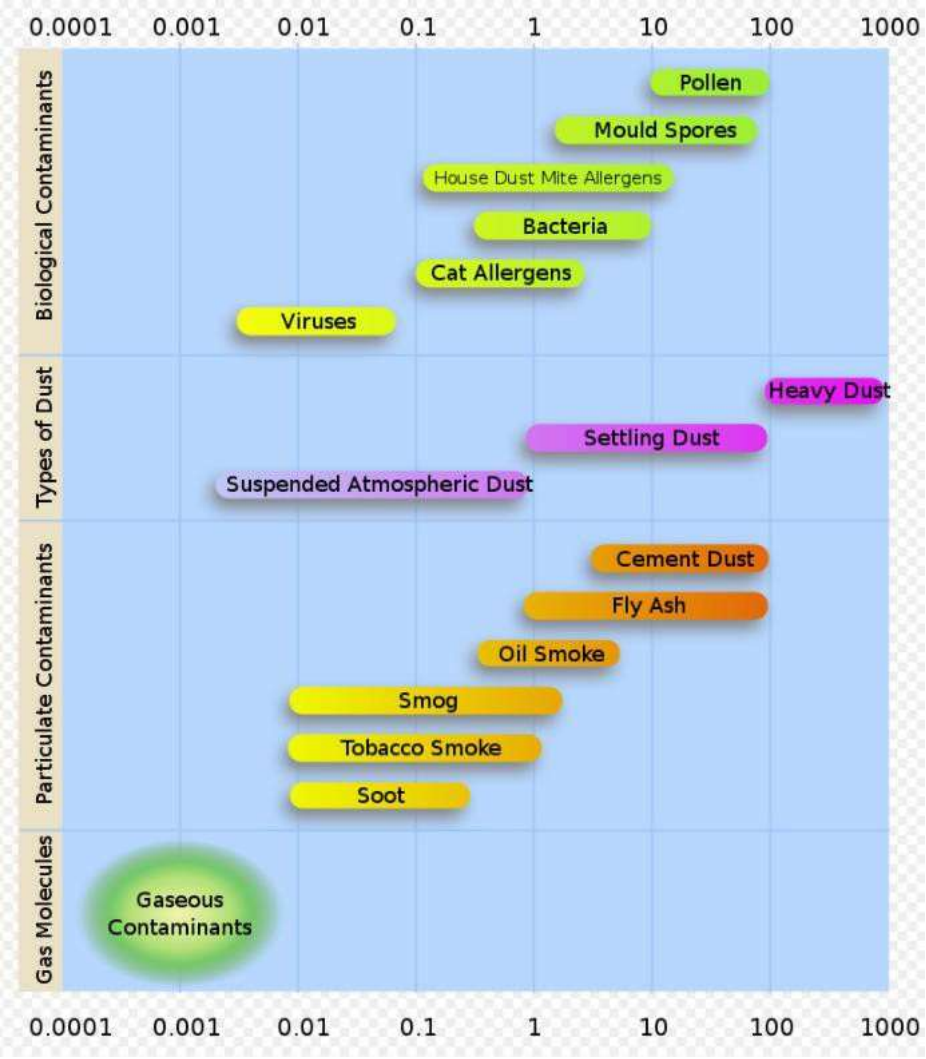
As previously mentioned, vessels at port have diesel engines running by generating NO_x, SO_x, CO_2 and creating noise vibration and fuel consumption.

NOx is consisted of nitrogen compounds such as Nitrogen dioxide (NO_2) and nitrogen oxide (NO). It is usually release during fuel combustion, especially in high temperatures. NOx gases react to form smog and acid rain. There are severe health impacts due to NOx gases which are mainly affect human's respiratory system, leading to asthma, emphysema, bronchitis and heart diseases which can lead to extensive damage to lung tissues and early death.

Sulfur oxides (SOx) are emitted by the burning of fossil fuels (coal, diesel and oil) or other sulfur containing materials. They can cause nasal irritation and lung problems which can lead to serious respiratory problems, in particular to persons suffering from chronic obstructive pulmonary disease (COPD).

Particulate Matter (PM), also known as atmospheric aerosol particles and particulates are produced during the burning of fossil fuels. They are microscopic particles of solid or liquid matter and they are divided in categories by their size:

- $PM_{2.5:}$ Their diameter is 2.5μm or less and are the most dangerous, as they can be deadly because they can penetrate deep into lungs and affect person's respiratory system and heart.
- PM_{10}: Diameter of 10μm or less and could irritate nose, eyes and respiratory system.



Types, and size distribution in micrometers, of atmospheric particulate matter.

Sometimes ships can cause large noise problems, produced by auxiliary engines and funnel noise, while berthing at ports. Port authorities worldwide, such as Amsterdam. Cork, Copenhagen, Malmo, Hamburg, Koper, New South Wales, Rotterdam, Stockholm and Vancouver are receiving rising complains each year for noise disturbance which causes

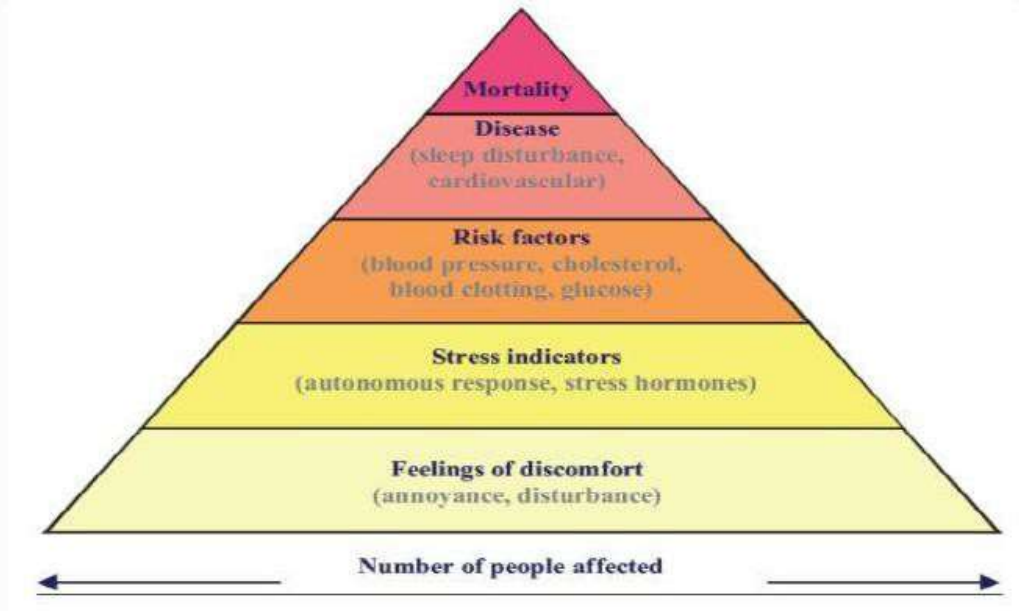
sleepless nights. But these are not the only cases; ship noise is an increasing issue for the maritime industry which have significant negative effects on those living in and around harbor areas.

Measurements from different distances and different angles were made to characterize ship-oriented noises. In these measurements, noise emissions were down and up during maneuver. Noise emissions during maneuver are more than 20dB and range from 50-5000 Hz.

After berthing to the port, the most noise supply of electrical generator and ventilation systems was determined to be the most noise in the noise detection on board. The noise frequency range of ventilation systems is between 200 and 10000Hz. With the combination of ventilation systems and generators, a high-frequency noise emissions were detected by researches that it was 200-5000 Hz as a range.

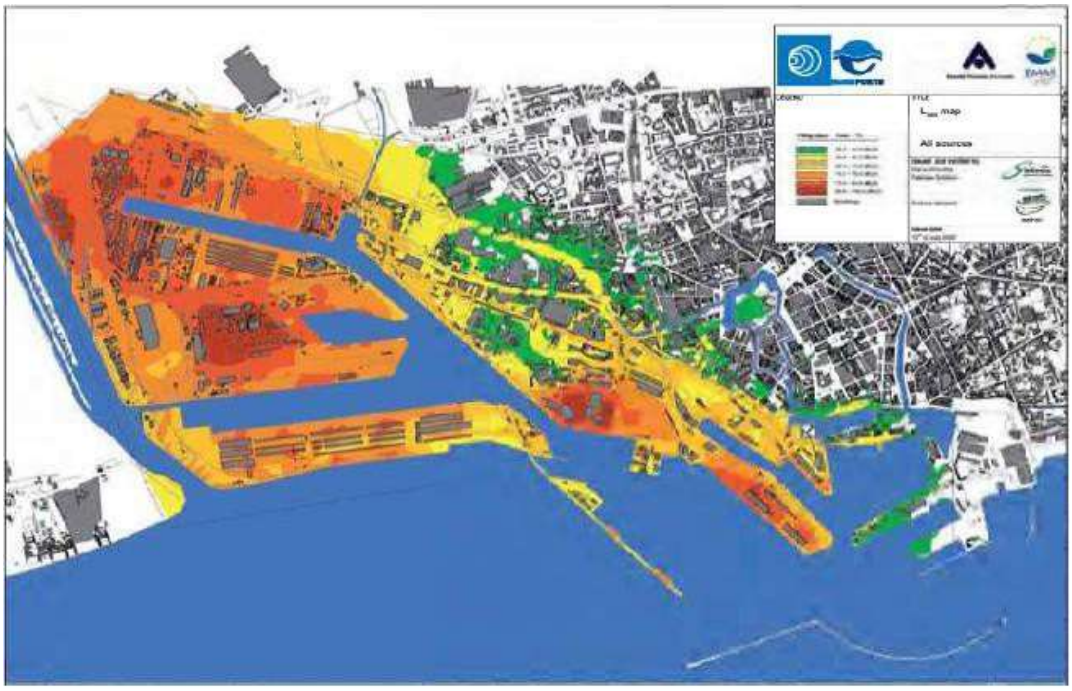
Considering the ships in transit around the port, the ships are different from each other to power, size, architecture and, of course, noise propagation. In addition, when even the bots become maneuvers, the noise values go up and down. The difference between this highest noise value and the lowest noise value is measured as 20dB(A).

World Health Organization (WHO) released Night Guidance for Europe Document on 2009 in which Environmental noise and its health impact on residents was highlighted. Even though people do not immediately realize the impact on health, ears are slowly damaged and if this happens for a long period, commences the stage deterioration of the ears. The report, published by WHO, states that environmental noise in areas with high urban population density is the second most dangerous type of environmental pollution after air pollution.
While other environmental pollution problems tend to increase and decrease over time, noise pollution is increasing day by day and continues to negatively affect the health of future generations. At the same time, noise pollution causes changes in the socio-cultural, economic and aesthetic structure of society as a cultural phenomenon. The most commonly known effects of noise are the effect on hearing. A single high voice can permanently damage the hearing system, but if it is exposed to sounds for a long time at a lower decibel level, it can lead to permanent changes in the ears and cause hearing impaired such as tinnitus.



Severity of health effects of noise and number of people affected

To sum up, this picture showing the severity of the effects and the number of people affected. In addition, on the top of the iceberg, that noise is a risk factor to preterm death cases. The noise source, its meaning to the individual, qualities, occurrence over time, familiarity, controllability and predictability affect these reactions



Example of noise mapping in Port of Livorno

1.3 BENEFITS

While maritime industry entering a new, environmentally-friendly period, stakeholders are constantly seeking for new ways to reduce their ships' emissions. One of them, which has a great and constant impact is the application of Cold Ironing. Installation and use of AMP in ports could bring numerous benefits for all parties involved.

Regarding terminals, ports and cities, countries respectively, reduction of air emissions and air and noise vibration in coastal areas is the biggest advantage. Citizens' quality of life will improve and life expectancy will increase. Besides that, state's responsibility towards society will be emerged, which is very important and vital for solid and healthy modern societies. Privilege will be visible in economic sector as well due to a new source of revenue and ability to attract new clients but also by giving jobs to many local enterprises which will be responsible for the project. Given that these programs are co-founding by countries, EU and big companies, depreciation of the investment will speed up.

Vessels and shipping companies will, first of all, reduce fuel costs given that electricity is less expensive than the bunkering cost. Also, they will save money from maintenance costs of auxiliary engines and increase their life time. In addition, maritime industry has become too

competitive and companies' primary goal is to transport good safely in time. New legislations towards GHG emissions will obligate vessels to make installations and modifications which will affect main engine and vessel's speed, in order to become eco-friendly. Cold ironing is offering a perfect solution to above problem, giving to vessels and their companies an alternative way to cut off emissions, without reducing vessel's speed.

Last but not least, a major advantage for all parties involved is that by applying cold ironing they will comply both with local and global environmental legislations. Apart from that, these installations could reinforce involved parties' public image as they will be responsible for positive environmental implications. It is a common belief that companies investing in their public image and social awareness are keeping a strong position among competition and are becoming solid stakeholders.

2.0 BACKGROUND

2.1 HISTORICAL OVERVIEW OF COLD IRONING

Cold ironing took its name from past-ancient years when ships were using coal-fired engines. When a ship was berthing in port, her crew did not have to continue to feed the fire and the iron engines would cool down, going after some hours, totally cold.

Over last 25 years, some advances ports, especially in Europe and USA, are demanding from vessels to shut down their engines during their visit. In fact, the Port of Los Angeles/Long Beach (la/lb) first introduced wide-spread application of cold ironing only in 2004. A confluence of events created the political will and conditions to make cold ironing a reality. Clean air regulation in the United States and California first began to materialize in real force.

US Navy has been using alternative power for running combat ships at berth since 1960. Their primary goal was to reduce vessel's equipment overload during berthing but the benefits of bringing down the number of pollutants and fuel saving were obvious.

2.2 EXISTING LEGISLATION

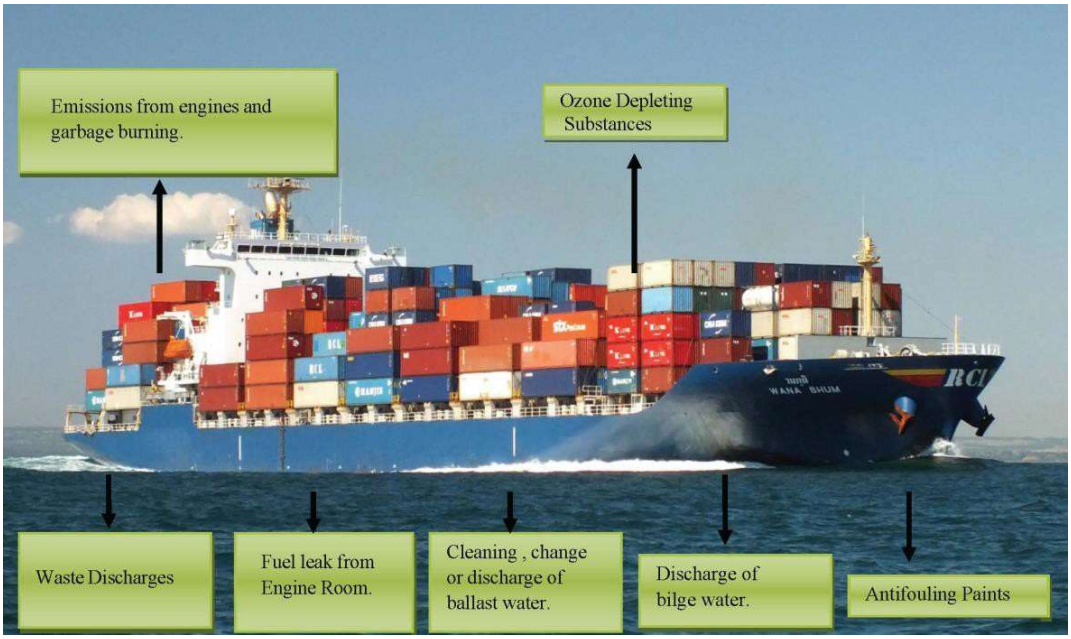
2.2.1 IMO LEGISLATION

In 1948, an international convention of the United Nations, established the Inter-Governmental Maritime Consultative Organization (IMCO), which name was changed in 1982 to **International Maritime Organization (IMO)**. The purpose of the organization is "to provide machinery for cooperation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships». The Organization is also empowered to deal with administrative and legal matters related to these purposes.

The international convention for the prevention of Pollution from Ships, 1973 (MARPOL Convention) was adopted by the International Conference on Marine Pollution convened by the IMO from 8 October to 2 November 1973. MARPOL's regulations covering the various sources of ship-generated pollution are contained in the five Annexes of the convention.

Marine Environmental Protection Committee (MEPC), since its inception in 1974, has reviewed various provision of the MARPOL convention that have been found to require clarification or have given rise to difficulties in implementation. In some cases, MEPC recognized that there was a need to amend existing regulations or introduce new ones with

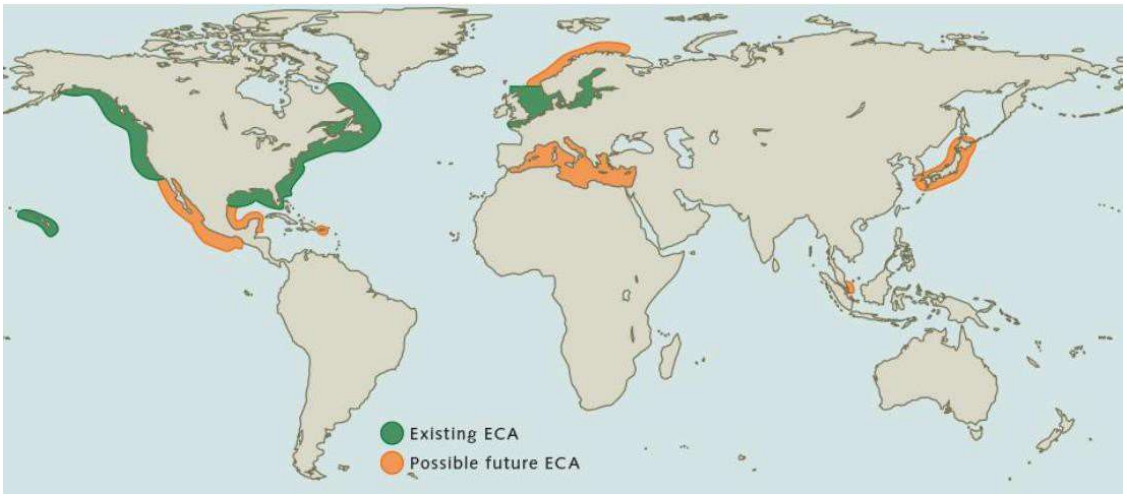
the aim of reducing further operational and accidental pollution form ships. Above has resulted in a number of unified interpretations and amendments to the MARPOL convention.



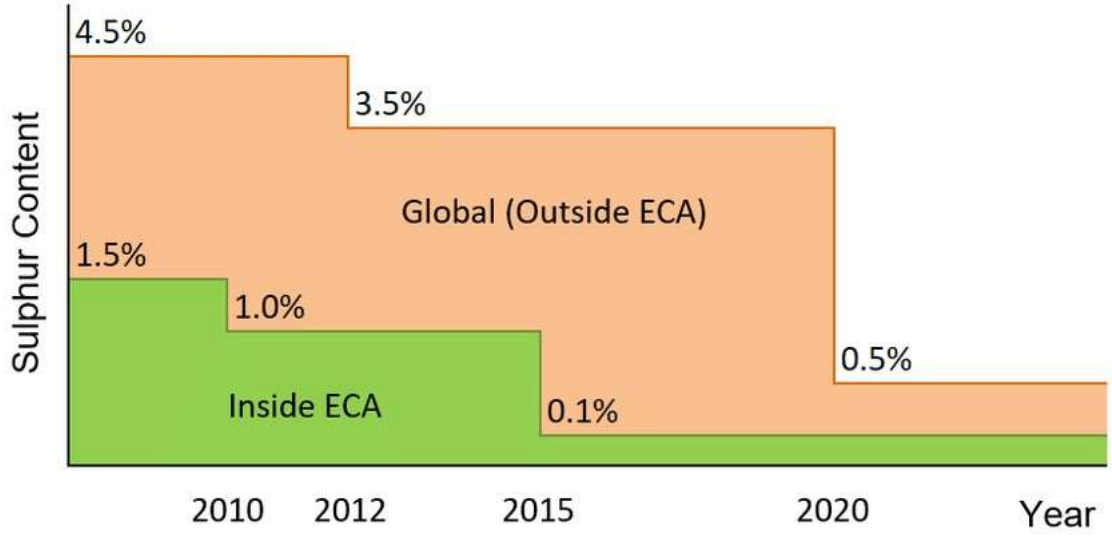
Vessel's garbage and pollution production

ANNEX VI – Regulations for the prevention of air pollution form ships, which is in current's thesis scope, contains regulations, amendments and guidelines referring to ship's pollutants that affect air environment. Annex VI came into force on 2005 and set limits on SO_x NO_x PM emissions for fuel combustion. MARPOL's Annex VI is ratified by 75 countries which in numbers is translated as 95% of worldwide ships traffic. All ships flagged under countries that are signatories to MARPOL are subject to its requirements, wherever they sail. Member nations are responsible for vessels registered under their respective nationalities.

An amendment came into force in 2010 imposing more stringent limits and introduce emission control areas (ECA). These areas are located in the North Sea, the Baltic Sea, the North America region and the United States Caribbean area. The amendment aimed to reduce the Sulphur cap in fuel from 3,5% to 0,5% by 2020. Above brought severe changes in maritime industry such as installation of scrubber and use ultra-low Sulphur fuel oil. Revised Annex imposed restrictions to NOx limits on vessels depending on when they were built by separating them to three categories; Tier I, Tier II, Tier III.



Existing and possible future ECA



During MEPC 66th session held on March 2014, **Energy Efficiency Design Index (EEDI)** and **Ship Energy Efficiency Management Plan (SEEMP)** were introduced and adopted in MARPOL Annex VI. EEDI is referring to new ships (built after 2013) and SEEMP is mandatory for not only all vessels but managing companies as well.

Cold ironing has been discussed in many MEPC's sessions, especially on **54th and 55th**, where committee set guidelines for standardization of on-shore power supply. Sub-committee on ship systems and equipment (SSE) has also discussed the development of guidelines for cold ironing in ships.

2.2.2 EU LEGISLATION

All nations must adhere to the minimum standards of IMO regulations. However, more stringent regulations can be imposed by countries themselves. European Union (EU) has ambitious environmental policy and targets which affect maritime sector as well.

In 2005, Directive **2005/33/EC which amended 1999/32/EC** was published, defining emission control areas in the English Channel, North Sea and the Baltic Sea. In these areas a Sulphur cap of 1.5% was set and ships at anchorage or in any EU port were required to use fuel with 0.1% Sulphur. Apparently, this regulation was much tighter than MARPOL's ones at that time.

In 2012, Directive **2012/33/EU** set out further restriction on Sulphur content of fuels. Apart from that, for the first time, the concern of air pollution in ports was highlighted and recommended that: '' Member states should encourage the use of shore-side electricity, as electricity for present-days ships is provided by auxiliary engines.''

Conversations on cold ironing wen further in 2014 as the EU approved the Directive **2014/94/EU** on the deployment of Alternative Fuel Infrastructures. Among others, in this directive is mentioned that: "Member States shall ensure that the need for shore-side electricity supply for inland waterway vessels and sea-going ships in maritime and inland ports is assessed in their national policy frameworks. Such shore-side electricity supply shall be installed as a priority in ports of the Trans-European Transport Network (TEN-T Core Network), and in other ports, by 31 December 2025, unless there is no demand and the costs are disproportionate to the benefits, including environmental benefits" (European Commission, 2014).

Towards efforts to reduce air pollution, EU published **Regulation (EU) 2015/757** OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the monitoring, reporting and verification (MRV) of carbon dioxide emissions from maritime transport. In a nutshell, every vessel above 5000 GT operating in EU ports should have a system of Monitoring, Reporting and Verifications of her emissions. The primary aim of this regulation which entered into force on 1st July 2015 is for reducing CO2 emissions from maritime transport.

The **EU emissions trading system (EU ETS)** is a cornerstone of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost-effectively. It is the world's first major carbon market and remains the biggest one.

2.2.3 LEGISLATION AROUND THE WORLD

All governments around the world are imposing local regulations based on IMO's studies and their own environmental strategy. Some of them are:

- California: Carb
- China (MoT of China)
- Sydney Harbour
- Singapore: Green Ship and Green Port Programs

2.2.4 SHORE CONNECTION INTERNATIONAL STANDARDS

A Standard is an established norm or requirement that relates to a technical system for testing, measurement or materials.

- Standards are developed to ensure a common understanding between all involved parties.
- Standards may be international, national, state or industry specific.
- A Standard is not legally blinding until it forms part of a legal document.

The first universal, international standard defining voltage shore connections systems is **IEC/ISO/IEEE 80005-1**, published on August 2012.

Above was withdrawn and a new one published on March 2019, **IEC/IEEE 80005-1:2019** Utility connections in port — Part 1: High voltage shore connection (HVSC) systems — General requirements.

IEC/IEEE 80005-1:2019 ''describes high-voltage shore connection (HVSC) systems, onboard the ship and on shore, to supply the ship with electrical power from shore. This document is applicable to the design, installation and testing of HVSC systems and addresses: - HV shore distribution systems, - shore-to-ship connection and interface equipment, - transformers/reactors, - semiconductor/rotating frequency convertors, - ship distribution systems, and - control, monitoring, interlocking and power management systems.''

There are also another two standards which are under development:

i) IEC/IEEE 80005-2:2016 Utility connections in port — Part 2: High and low voltage shore connection systems — Data communication for monitoring and control.

ii) IEC/IEEE DIS 80005-3 Utility connections in port — Part 3: Low Voltage Shore Connection (LVSC) Systems — General requirements.

2.2.5 FUTURE INTENTIONS

Climate change and environmental degradation are an existential threat to Europe and the world. IMO, EU and governments are constantly working to find solutions and grow an environmentally friendly strategy, taking into account economic and technology changes.

The **European Green Deal** provides an action plan to boost the efficient use of recourses by moving to a clean, circular economy, restore biodiversity and cut pollution. Following are some of the

- Climate neutral Europe by 2050, including shipping industry.
- New European Committee (EC) 2030 EU target; 0% → 55% / 60% reduction (1990 baseline)
- Strong push from European Parliament (EP) and EC to include shipping in ETS, but proposed timing, scope and revenue usage differs
- European Climate Law (mid-2021) key vehicle for future actions.

EU Parliament endorsed proposed amendments to MRV regulation on 16th September 2020:

- Reduce the annual CO2 emissions/transport work by at least 40% by 2030
- **By 2030, no ships emit GHG emissions when at berth**
- By 31 December 2021, methane emissions in EU MRV regulation
- From 1 January 2022, shipping to be included in the EU ETS

- From 2022 to 2030, “Ocean Fund” financed by at least 50% of ETS revenues
- By 1 July 2021, EC shall set a performance labelling system for ships
- By 31 December 2022, assessment report on the impact of GHG emissions other than CO2 and CH4

The adoption of Paris Agreement in December 2015, is an agreement between 195 countries which have agreed to keep a global temperature rise this century well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C.

Despite the fact that shipping industry has not yet been included in any international climate agreement, **IMO’s** strategy is also at the same spirit. Following years of conversations and internal debate between IMO’s committees, the IMO has finally developed a challenging roadmap for the decarbonization of the sector.

IMO’s strategy aims to zero total GHG emissions from shipping and to reduce the average carbon intensity (CO2 per ton-mile) by 40% by 2030 and 70% before mid-century. GHG reduction candidate measures:

i) Short-term measures (2018-2023)

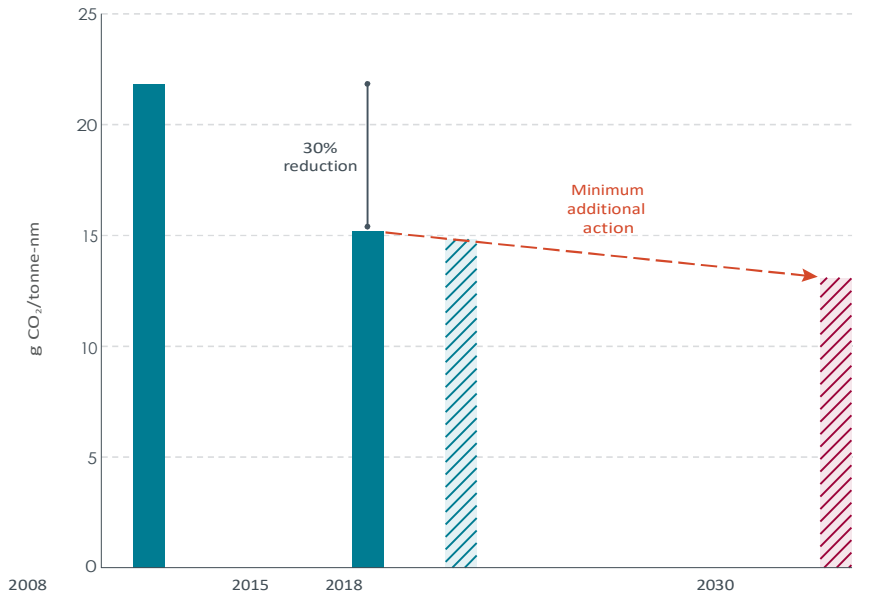
1. Energy efficiency improvement focus on EEDI and SEEMP
2. Technical and operational energy efficiency measures (e.g., FORS, ISPI, etc.)
3. Carbon Intensity Indicator (CII)
4. Existing Fleet Improvement Program
5. Speed optimization and speed reduction
6. Address emissions of methane and VOCs
7. National action plans to address GHG emissions
8. Enhance technical cooperation and capacity-building.
9. Encourage port developments and activities globally
10. Initiate R&D
11. Incentives for first movers
12. Lifecycle GHG/carbon intensity guidelines for all types of fuels
13. Actively promote the work of the organization
14. Undertake additional GHG emission studies

ii) Mid-term measures (2023-2030)

1. Effective uptake of alternative fuels
2. Enhance the energy efficiency performance
3. New/innovative emission reduction mechanism (MBMs)
4. Enhance technical cooperation and capacity-building activities
5. Development of a feedback mechanism to enable lessons learned

iii) Long-term measures (2030 -)

1. Provision of **zero-carbon or fossil-free fuels**
2. Other possible new/innovative emission reduction mechanism(s)



CO_2 intensity of international shipping, 2008 to 2030. *Note*. Derived from Smith et al. (2015), Olmer, Comer, Roy, Mao, and Rutherford (2017), and UNCTAD (2019).

2.3 CURRENT STATUS OF COLD IRONING

Numerous ports have already applied the method of Cold Ironing worldwide. The majority of installations are in East Coast of USA and in countries of North Europe, due to strict local environmental legislation and local companies' environmental and social awareness. In many cases, installations are public funded given the occurred benefits not only for the environment – local hygiene but also for the local – national economy.

Year of Introduction	Port	Country	Capacity (MW)	Frequency (Hz)	Voltage (kV)	Vessel Type using OPS
2015	Hamburg	Germany	12	50 // 60	6.6 // 11	Cruise Ships
2013	Trelleborg	Sweden	3.5 – 4.6	50	11	RoPax
2012	Ystad	Sweden	6.25	50 // 60	11	RoPax
2012	Rotterdam	Netherlands	2.7	60	11	RoPax
2011	Prince Rupert	Canada	7.5	60	6.6	Cargo
2011	Oslo	Norway	4.5	50	11	Cruise Ships
2011	Long Beach	U.S.A.	16	60	6.6 // 11	Container
2010	Karlskrona	Sweden	2.5	50	11	RoPax
2010	San Francisco	U.S.A.	16	60	6.6 // 11	Cruise Ships
2010	San Diego	U.S.A.	16	60	6.6 // 11	Cruise Ships
2009	Vancouver	Canada	16	60	6.6 // 11	RoPax
2008	Lubeck	Germany	2.2	50	6	RoPax
2008	Antwerp	Belgium	0.8	50 // 60	6.6	Container
2008	Oulu	Finland	1.2	50	6.6	RoPax
2006	Kotka	Finland	1.0	50	6.6	RoPax
2006	Kemi	Finland	1.0	50	6.6	Ropax
2005-2006	Seattle	U.S.A.	12.8	60	6.6 // 11	Cruise Ships
2004	Pitea	Sweden	1.0	50	6	RoRo
2004	Los Angeles	U.S.A.	7.5-60	60	6.6 // 11	Container Cruise Ships
2001	Juneau	U.S.A.	7-9	60	6.6 // 11	Cruise Ships
2000	Zeebrugge	Belgium	1.25	50	6.6	RoRo
2000-2010	Gothenburg	Sweden	1.25-2.5	50 // 60	6.6 // 11	RoRo // RoPax

List of Ports are currently using OPS

Shore power at the Port of Los Angeles

Power Cables at the Port of Seattle

Shore-side power connection at Figure III-8: Shore power connection on the USS POSCO facility in Pittsburg, CA

2.4 FUTURE PLANS FOR INSTALLATION OF COLD IRONING IN MAJOR PORTS

Given the constant efforts towards emissions' reductions and trying to retain their services at the highest level, many major ports around the world have already started investigation and examination in order to apply Cold ironing systems at their terminals.

Port	Country
Amsterdam	Netherlands
Barcelona	Spain
Bergen	Norway
Civitavecchia (Rome)	Italy
Georgia	U.S.A
Genoa	Italy
Helsinki	Finland
Hong Kong	Hong Kong
Houston	U.S.A.
Kaohsiung	Taiwan
Le Havre	France
Livorno	Italy

Marseille	France
Killini	Greece
Nagoya	Japan
Oakland	U.S.A.
Richmond	U.S.A.
Riga	Latvia
South Carolina	U.S.A.
Stockholm	Sweden
Tallinn	Estonia
Tokyo	Japan
Venice	Italy
Yokohama	Japan
Philippines	Philippines
Cyprus	Cyprus
Thessaloniki	Greece

2.5 THE ELEMED PROJECT

On 2016 three Member states of the EU, Greece, Cyprus and Slovenia have started the ELEMED project in order to apply Cold Ironing in their ports (Piraeus -Kilini, Limassol, Koper).

Elemed project prepares the ground for the introduction of cold ironing, electric bunkering and hybrid ships across the Eastern Mediterranean Sea corridor. It involves three EU member states -Cyprus, Greece and Slovenia- forming a strong consortium, comprised by a team of experts, from the marine, engineering and academic sector. The project aims at studying all technical, regulatory, safety and financial issues related to the shore produced electricity and electric propulsion for vessels in Eastern Mediterranean region.

Co-financed by European Union, mentioned countries have joined their forces and created a strong team with experienced and ambitious partners such as:

- Hellenic Lloyd's SA
- NTUA
- Piraeus Port Authority
- Kyllini port
- Cyprus Port Authority
- Port of Koper
- Hydrus Engineering Ltd
- Spanopoulos Group

- Protasis SA
- Hellenic Centre for Marine Research

As per their calculations and estimations, applying OPS in the port of Piraeus could save 19 million Euro and 190 GWh/year, while at the port Kyllini they have already launched the 1st Pilot OPS for a Ro-Pax vessel.

Pilot OPS in the port of Kyllini

3.0 TECHNICAL OVERVIEW

3.1 REQUIRED EQUIPMENT

Based on existing installed cases, the standard equipment is common and could be used as basis for any installation. The proper connection and use of all the components will lead to desired outcome.

3.1.1 ELECTRICAL TRANSFORMER

Transformer is an electrical device which trades voltage for current in a circuit, without affecting the electrical power, by way of magnetic coupling. It converts high to low voltage so power can be used for vessels' energy demands. Transformer's size and capacity should be chosen upon port's demands.

3.1.2 SWITCHGEAR

Switchgear is composed of electrical disconnect switches, fuses or circuit breakers in order to protect the electrical equipment. Switchgear is used both to de-energize equipment to allow work to be done and to clear faults downstream. This type of equipment is directly linked to the reliability of the electricity supply. Thus, it is vital for the system as it defines the reliability of power provided and controls the safe function of other systems.

3.1.3 CABLES AND ELECTRICAL CONDUCTORS

Electrical cable is a thick wire, or a group of wires inside a rubber covering, which is used to carry electricity or electronic signals. Conductor is an object that allows the flow of charge in one or more directions. Electrical conductors are usually made of metal and allow the flow of electrical current.

3.1.4 CABLES' RECEPTION FACILITY

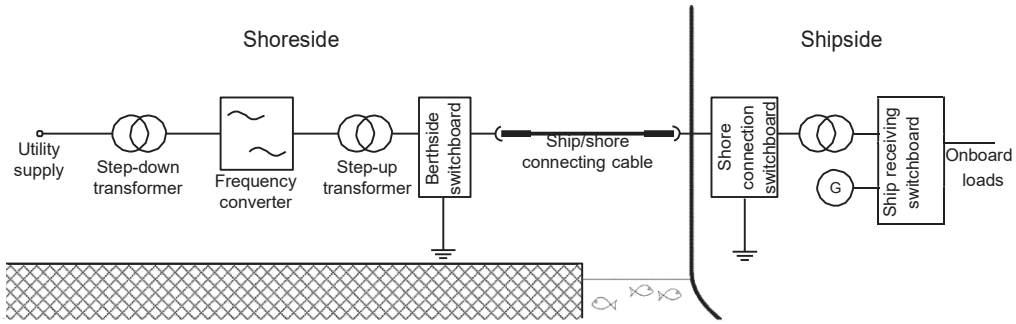
Cables' reception facility or receptacle pits are located in the edge of the dock port and are connected to port's switchgears. They are used to control the electrical equipment and ensure the safe function of the system.

3.1.5 EQUIPMENT ON BOARD FOR SHORE CONNECTION

In order to receive shore power, vessels do not have to make big installations or modifications. New ships, constructed after 2013 have 6.6kV voltage distribution while the majority of existing vessels have 440V and frequency of 60 Hz. The 440V distribution systems are not ideal for providing shore-based power because of the high amperage required. In order to reduce the losses caused by the augmented electrical resistance the supply of electrical power is performed in the following manner: the voltage up to the berth face is as high as 6.6kV and a step---down transformer that can be located either on board of the ship or at the berth face provides with 440V the distribution systems. Supply current should be 6.6kV for the evasion of brownout, but a transformer could drop it at 440V to distribute on board.

In existing cases, there are two used methods for shore connection. Either vessel's power to be turned off and then connected to shore or remain activated and synced to shore's power for a constant transfer of energy. In the first connection way, power interruptions may occur which is not acceptable for some type of vessels. A short time power interruption can be

tolerated in a containership, although it is basic engineering that power interruptions are detrimental to equipment reliability and lifetime. As a result, the synchronization of power sources, vessel's generators and shore-based is promoted globally regardless the type of commercial vessel.



Generic requirements of cold ironing system

3.2 SHORE-VESSEL CONNECTION

Connection between vessel and shore system is accomplished with the use of connecting cables. Cables could be used by the following possible ways:

i) Elevation of cables trough a crane truck which is the most unusual way of connection. Crane truck with is connected to reception facility and then connects with on board system to provide power. It is not widely used due to the high cost of the crane truck.

ii) Cable system installed on board of the vessel. Many vessels have already installed the system in their main deck (usually on port side. It is a hydraulic system which allows cables to extend and connect to shore facility. This system could be installed either on existing or new vessels and it is a simple installation which does not affect any other vessel's system. In cases where vessel haves a fixed route (Ro-Ro, Containers) between ports supporting shore side connection, this is the most efficient and fast way of connection.

iii) Transfer of cables from shore facility to vessel via crane. This is the most common way to connect in the existing installations. Crane transfers and elevates the cables from shore facility to vessel. It is the most common way due to its low cost of investment as it uses the already existing port's cranes and its safe and fast connection.

3.3 POWER REQUIREMENTS AT BERTH

Vessels need electrical power for various and vital operations and procedures at berth. Some of them are:

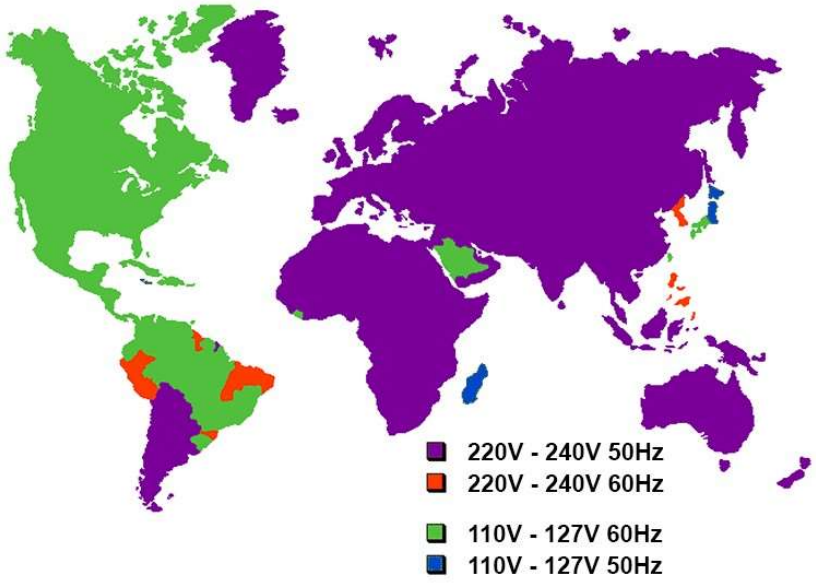
i. Pumps (Ballast, Bilge, Cargo, General use) Function
ii. Air Conditioners (Accommodation, Engine Room)
iii. Compressors of Provision Rooms
iv. Essential Services (Boiler, Fresh Water, Sea Water Pumps, Incinerator, Economizer, Air Compressors, Steering Gear)
v. Spaces Ventilation (Cargo Holds, Tanks, Engine Room, CO2 Room)
vi. Hydraulic Systems (Mooring Winches, Hatch Covers, Cranes)
vii. Cargo Operations (Cargo Pumps in Tankers, Operating Load in Containers, Cranes in Bulk - General Cargo)
viii. Navigational and Radio Equipment
ix. Purifier and fuel pumps (HFO, LO transfer Pump, MDO Purifier, etc.)
x. Galley Services
xi. Emergency Equipment (Generator, Pumps, Fire Pump, Bow Thruster)
xii. Lighting and accommodation services.

Clearly, a vessel could not be operational without electrical power as many of its main procedures are affected.

Each vessel has different energy demand, which is depending on size, age, type, country of built, people on board and cargo operations. Based on other studies made regarding vessels' demand, below briefly presented the results:

Average Power Requirements	
Vessel Type	**Power Requirements**
Tanker	5 - 6 MW
Containership	1 - 4 MW
Reefer	2 - 5 MW
Ro-Ro	700 kW
Bulk Carrier	500 kW - 1 MW
Cruise Ship	7 MW

Obviously, Cruise Ships are the vessels with the biggest energy demand due to high accommodation needs, while bulk and general cargo carriers are the ones with the lowest. Of course, as mentioned these numbers are only estimations and calculations based on other researches and could not represent the real power requirements of a sea-going vessel.



Vessels use voltage depending on country built.

4.1 DATA COLLECTION

In order to acquire a more specific and complete picture of vessels' power requirements, we tried to collect some real data from sea-going vessels. We have contacted few shipping companies, asking them for data, *Pantheon Tankers Management Ltd*. and *Alpha Bulkers Shipmanagement Inc.* have responded positively to our inquiry and we really appreciate their effort and contribution to current thesis.

Pantheon Tankers is a Greek Shipping management company founded on 2012 and manages a fleet of 36 tankers of 6.203.664 DWT (MT) in total while Alpha Bulkers founded on 2004 is also a Greek shipping management company managing a fleet of 33 Bulk Carriers of 4.931.868 (mt) total tonnage. Both companies are also having new buildings programs and environmental compliance strategy and are leading independent Shipping Companies providing ship management services to Tanker and Bulk sectors accordingly.

4.1 VESSELS UTILIZED FOR DATA COLLECTION

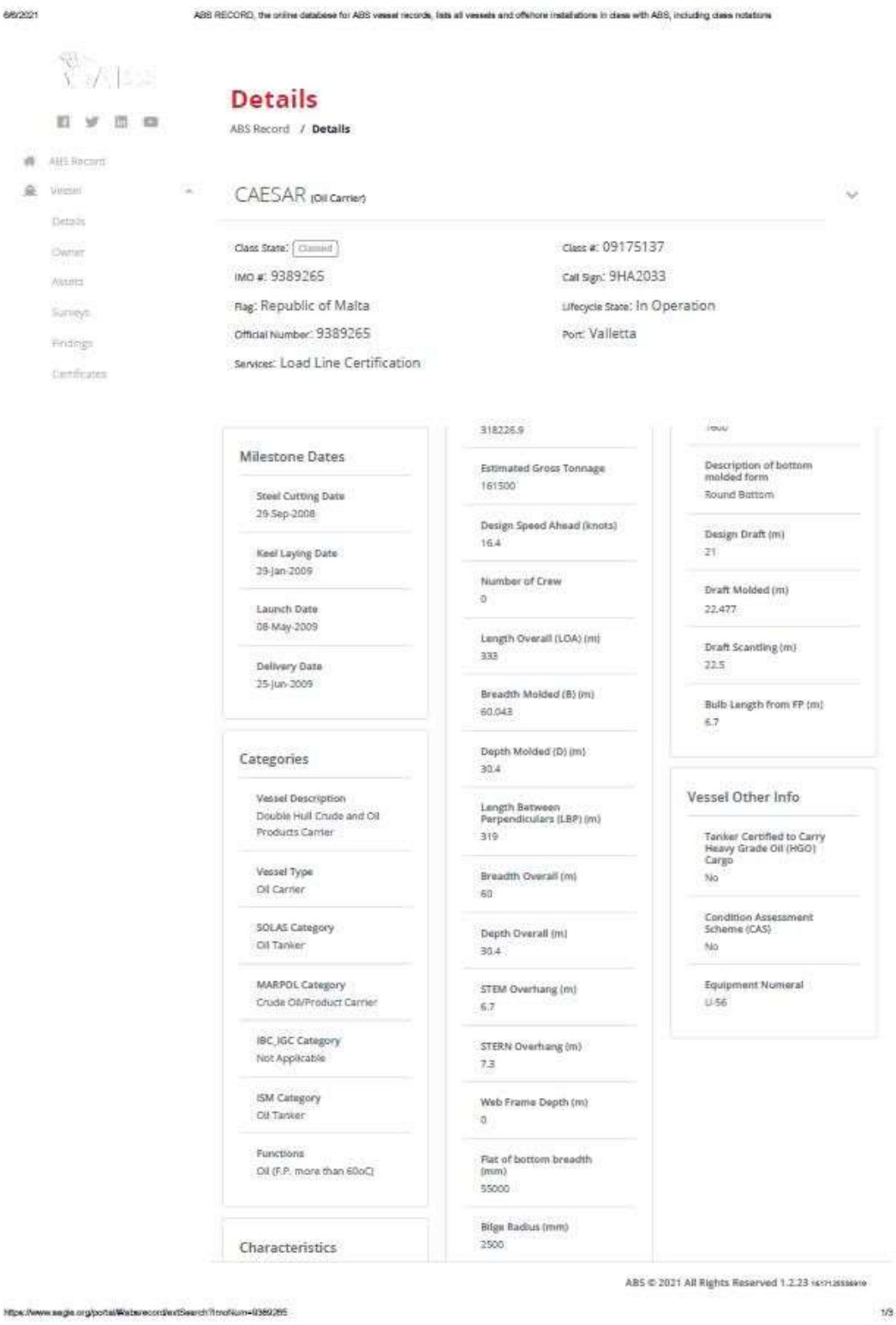
Our concept was to have data for vessels of different type, size and age so we can have a complete picture of energy demands. Upon our perfect communication and cooperation with mentioned companies, we have received data for two vessels of each company.

M/T Caesar and M/T Pegasus from Pantheon Tankers and M/V Alpha Bravery and M/V Alpha Charm from Alpha Bulkers. All of them are sea-going vessels of different types, sizes and ages and are in our initial scope of research.

In the table below, there are briefly presented their basic information, as extracted from their classification societies records:

REGISTER DATA				
VESSEL NAME	**CAESAR**	**PEGASUS**	**ALPHA BRAVERY**	**ALPHA CHARM**
IMO NUMBER	9389265	9412103	9527910	9827516
TYPE	Oil Carrier	Crude oil carriage	Bulk carrier	Bulk Carrier
GROSS TONNAGE	161500	80028	93715	44114
LENGTH OVERALL (LOA) (m)	333	274	274	229
BREADTH OVERALL (m)	60	48	48	32,26
DEPTH OVERALL (m)	30,4	23,1	24,75	20
DEAWEIGHT (tonnes)	299997.1	158267	179398	82052
DIESEL GENERATORS - ALTERATORS	3 sets - 1825 kVA, 1500 kW x 450V (60Hz)	3 sets - 1500 kVA, 1200 KW x 450 V (60Hz)	3 Sets - 925 kVA - 740 kW (66HZ)	3 Sets - 450 V - 665 kW (60 Hz)
BUILDER	HYUNDAI HEAVY IND. CO., LTD.	Hyundai Heavy Ind. Co.,Ltd. (Hull number: 1979)	HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD. (S. KOREA)	Jiangsu New Yangzi Shipbuilding Co.,Ltd. (CHINA)
DELIVERY DATE	Jun 2009	Jun 2009	Aug 2010	Oct 2018

ABS: M/T CAESAR Vessel Register



6/9/2021 ABS RECORD, the online database for ABS vessel records, lists all vessels and offshore installations in class with ABS, including class notations

Details

ABS Record / Details

ABS Record
Vessel
Details
Owner
Assets
Surveys
Findings
Certificates

CAESAR (Oil Carrier)

Class State: Classed
IMO #: 9389265
Flag: Republic of Malta
Official Number: 9389265
Services: Load Line Certification

Class #: 09175137
Call Sign: 9HA2033
Lifecycle State: In Operation
Port: Valletta

Milestone Dates

Steel Cutting Date
29-Sep-2008

Keel Laying Date
29-Jan-2009

Launch Date
08-May-2009

Delivery Date
25-Jun-2009

Categories

Vessel Description
Double Hull Crude and Oil Products Carrier

Vessel Type
Oil Carrier

SOLAS Category
Oil Tanker

MARPOL Category
Crude Oil/Product Carrier

IBC_IGC Category
Not Applicable

ISM Category
Oil Tanker

Functions
Oil (F.P. more than 60oC)

Characteristics

318226.9

Estimated Gross Tonnage
161500

Design Speed Ahead (knots)
16.4

Number of Crew
0

Length Overall (LOA) (m)
333

Breadth Molded (B) (m)
60.043

Depth Molded (D) (m)
30.4

Length Between Perpendiculars (LBP) (m)
319

Breadth Overall (m)
60

Depth Overall (m)
30.4

STEM Overhang (m)
6.7

STERN Overhang (m)
7.3

Web Frame Depth (m)
0

Flat of bottom breadth (mm)
55000

Bilge Radius (mm)
2500

Description of bottom molded form
Round Bottom

Design Draft (m)
21

Draft Molded (m)
22.477

Draft Scantling (m)
22.5

Bulb Length from FP (m)
6.7

Vessel Other Info

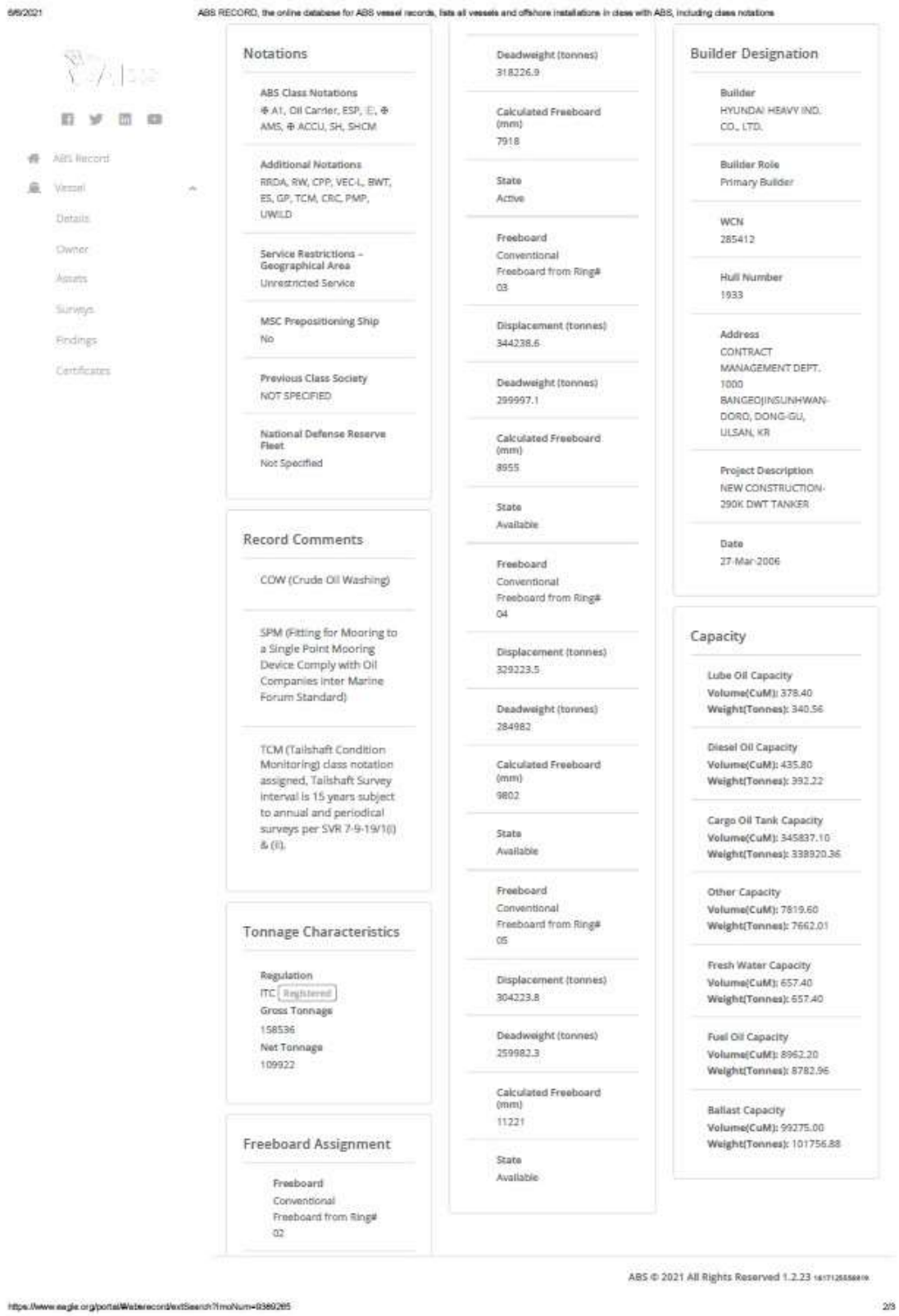
Tanker Certified to Carry Heavy Grade Oil (HGO) Cargo
No

Condition Assessment Scheme (CAS)
No

Equipment Numeral
U-56

ABS © 2021 All Rights Reserved 1.2.23

https://www.eagle.org/portal/#/absrecord/extSearch?imoNum=9389265 1/3



6/9/2021 ABS RECORD, the online database for ABS vessel records, lists all vessels and offshore installations in class with ABS, including class notations

ABS Record
Vessel
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Notations

ABS Class Notations
⊕ A1, Oil Carrier, ESP, E, ⊕ AMS, ⊕ ACCU, SH, SHCM

Additional Notations
RRDA, RW, CPP, VEC-L, BWT, ES, GP, TCM, CRC, PMP, UWILD

Service Restrictions – Geographical Area
Unrestricted Service

MSC Prepositioning Ship
No

Previous Class Society
NOT SPECIFIED

National Defense Reserve Fleet
Not Specified

Record Comments

COW (Crude Oil Washing)

SPM (Fitting for Mooring to a Single Point Mooring Device Comply with Oil Companies Inter Marine Forum Standard)

TCM (Tailshaft Condition Monitoring) class notation assigned, Tailshaft Survey interval is 15 years subject to annual and periodical surveys per SVR 7-9-19/1(i) & (ii).

Tonnage Characteristics

Regulation
ITC Registered
Gross Tonnage
158536
Net Tonnage
109922

Freeboard Assignment

Freeboard
Conventional
Freeboard from Ring#
02

Deadweight (tonnes)
318226.9

Calculated Freeboard (mm)
7918

State
Active

Freeboard
Conventional
Freeboard from Ring#
03

Displacement (tonnes)
344238.6

Deadweight (tonnes)
299997.1

Calculated Freeboard (mm)
8955

State
Available

Freeboard
Conventional
Freeboard from Ring#
04

Displacement (tonnes)
329223.5

Deadweight (tonnes)
284982

Calculated Freeboard (mm)
9802

State
Available

Freeboard
Conventional
Freeboard from Ring#
05

Displacement (tonnes)
304223.8

Deadweight (tonnes)
259982.3

Calculated Freeboard (mm)
11221

State
Available

Builder Designation

Builder
HYUNDAI HEAVY IND. CO., LTD.

Builder Role
Primary Builder

WCN
285412

Hull Number
1933

Address
CONTRACT MANAGEMENT DEPT. 1000 BANGEOJINSUNHWAN-DORO, DONG-GU, ULSAN, KR

Project Description
NEW CONSTRUCTION-290K DWT TANKER

Date
27-Mar-2006

Capacity

Lube Oil Capacity
Volume(CuM): 378.40
Weight(Tonnes): 340.56

Diesel Oil Capacity
Volume(CuM): 435.80
Weight(Tonnes): 392.22

Cargo Oil Tank Capacity
Volume(CuM): 345837.10
Weight(Tonnes): 338920.36

Other Capacity
Volume(CuM): 7819.60
Weight(Tonnes): 7662.01

Fresh Water Capacity
Volume(CuM): 657.40
Weight(Tonnes): 657.40

Fuel Oil Capacity
Volume(CuM): 8962.20
Weight(Tonnes): 8782.96

Ballast Capacity
Volume(CuM): 99275.00
Weight(Tonnes): 101756.88

https://www.eagle.org/portal/#/eaglerecord/vesselSearch?imoNum=9389265 2/3


9/5/2021
ABS RECORD, the online database for ABS vessel records, lists all vessels and offshore installations in class with ABS, including class notations
Vessel Timeline
Vessel Name changed to:
CAESAR
06-Apr-2006
Flag Name changed to:
Republic of Malta
06-Apr-2006
ABS Record
Vessel
Details
Owner
Assets
Surveys
Findings
Certificates

DNV-GL: M/T PEGASUS Vessel Register

PEGASUS

IMO number: 9412103

Identification

Vessel name:	PEGASUS
DNV id:	28034
IMO number:	9412103
Official number:	11887
Register:	
Other DNV services:	MRV,DCS,ERS,MLC,ISPS,ISM-VE
Class relation:	In DNV Class
Operational status:	In Operation
Signal letters:	SVAM3
Flag:	Greece
Port:	PIRAEUS
Type:	101 - Tanker for oil
Structural design type:	Monohull ship
Regulatory regime:	Ships
Main purpose:	Crude oil carriage
Additional purpose(s):	Oil product carriage, high flashpoint (>= 60 °C) Oil product carriage, low flashpoint (< 60 °C)

Owner

Owner:	Nirvana Navigation Inc (10061121) (IMO number: 5452385)
Manager:	Pantheon Tankers Management Ltd. (10129022) (IMO number: 5707428)
ISM/DOC holder:	Pantheon Tankers Management Ltd. (10129022) (IMO number: 5707428)

Classification

Class notation:	1A1 Tanker for oil CSR E0 ESP TMON VCS(2, B)
Register information:	
Type:	101 - Tanker for oil
Converted:	No
Previous class society:	
Class entry:	
Dual class:	
Equipment number:	5418,462
Class request:	2007-02-22
Class assignment:	2009-06-09
Commissioning:	

Certificates

Code	Certificate	Type	Term	Issued	Expires	Ext. until
CLCE	Classification Certificate	Class	Full	2019-08-20	2024-06-09	
ILO152-SoC	Register of Lifting Appliances and Cargo Handling Gear	Statement Of Compliance	Full	2020-08-10		
LIFT-SoC	Lift Survey Register	Statement Of Compliance	Full	2020-08-10		
TMCS-SoC	Suez Canal Special Tonnage Certificate	Statement Of Compliance	Full	2019-12-02		
ILLC-IC	International Load Line Certificate	Statutory	Full	2019-08-20	2024-06-09	
CCC-IC	Cargo Ship Safety Construction Certificate (International)	Statutory	Full	2019-08-20	2024-06-09	
CEC-IC	Cargo Ship Safety Equipment Certificate (International)	Statutory	Full	2020-02-28	2024-06-09	
CRC-IC	Cargo Ship Safety Radio Certificate (International)	Statutory	Full	2019-08-20	2024-06-09	
SMC	Safety Management Certificate	Statutory	Full	2019-08-08	2023-10-06	
ISPS-IC	International Ship Security Certificate	Statutory	Full	2019-08-08	2023-10-06	
MLC-IC	Maritime Labour Certificate (International)	Statutory	Full	2019-08-16	2023-07-29	
OPP-B-IC	International Oil Pollution Prevention Certificate, Type B	Statutory	Full	2019-08-20	2024-06-09	
SPP-IC	International Sewage Pollution Prevention Certificate	Statutory	Full	2019-08-20	2024-06-09	
IAPP-IC	International Air Pollution Prevention Certificate	Statutory	Full	2020-08-10	2024-06-09	
EEC-IC	International Energy Efficiency Certificate	Statutory	Full	2019-08-20		
AFS-IC	International Anti-Fouling System Certificate	Statutory	Full	2019-08-20		
BWM-T-IC	International Ballast Water Management Certificates	Statutory	Full	2019-08-20	2024-06-09	
REC-IHM-SoC	Inventory of Hazardous Materials Statement of Compliance	Statutory	Full	2021-03-14	2024-06-09	
ILO92-C	Crew Accommodation Certificate of Compliance - ILO 92 (issued on behalf of flag)	Statutory	Full	2019-08-20		
ILO133-C	Crew Accommodation Certificate of Compliance - ILO 133 (issued on behalf of flag)	Statutory	Full	2019-08-20		
EU-REC-IHM-C	Inventory of Hazardous Materials Certificate (EU regulation)	Statutory	Full	2021-03-14	2024-06-09	
GRC-LA-C	Cargo Gear Book / Lifting Appliances - Hellenic Republic	Statutory	Full	2009-06-09		

Surveys

Survey	Category	Location	Last date	Due from	Due to	Postponed
Main class renewal	Class	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Main class intermediate	Class	New York	2017-04-19	2021-03-09	2022-09-09	
Main class annual	Class	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Hull items	Class	Zhoushan FIS	2019-08-20			
Machinery items	Class	Zhoushan FIS	2019-08-20			
Machinery planned maintenance system annual	Class	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Bottom complete survey	Class	Zhoushan FIS	2019-08-20	2022-08-20	2022-08-20	
Propeller shaft (tailshaft) arrangement, oil lubricated	Class	Hyundai Site Office	2009-06-09			
Propeller connection keyless, flanged or clamped	Class	Zhoushan FIS	2019-08-20	2033-11-20	2035-02-20	

Survey	Category	Location	Last date	Due from	Due to	Postponed
Tailshaft monitoring annual	Class	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Auxiliary boiler complete	Class	Zhoushan FIS	2019-08-20	2022-08-20	2022-08-20	
Auxiliary boiler complete	Class	Zhoushan FIS	2019-08-20	2022-08-20	2022-08-20	
Auxiliary boiler complete	Class	Zhoushan FIS	2019-08-20	2022-08-20	2022-08-20	
Periodically unattended machinery space complete	Class	Zhoushan FIS	2019-08-20	2023-09-09	2024-06-09	
Periodically unattended machinery space annual	Class	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Vapour control system complete	Class	Zhoushan FIS	2019-08-20	2023-09-09	2024-06-09	
Lifting appliances	Statement Of Compliance	Lisbon FIS	2020-08-10	2021-05-20	2021-11-20	
Lifts	Statement Of Compliance	Lisbon FIS	2020-08-10	2021-05-20	2021-11-20	
Load line renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Load line annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Safety construction renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Safety construction intermediate	Statutory	New York	2017-04-19	2021-03-09	2022-09-09	
Safety construction annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Safety equipment renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Safety equipment periodical	Statutory	New York	2017-04-19	2021-03-09	2022-09-09	
Safety equipment annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Safety radio renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Safety radio periodical	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Safety management - vessel, renewal audit	Statutory	Casablanca	2018-07-09	2023-07-06	2023-10-06	
Safety management - vessel, intermediate audit	Statutory	Piraeus	2015-11-05	2020-10-06	2021-10-06	
Ship security renewal audit	Statutory	Casablanca	2018-07-09	2023-07-06	2023-10-06	
Ship security intermediate audit	Statutory	Piraeus	2015-11-05	2020-10-06	2021-10-06	
Maritime Labour Convention renewal audit	Statutory	Casablanca	2018-07-09	2023-04-29	2023-07-29	
Maritime Labour Convention intermediate audit	Statutory	Singapore	2021-05-20	2025-07-29	2026-07-29	
Oil pollution prevention, type B renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Oil pollution prevention,type B intermediate	Statutory	New York	2017-04-19	2021-03-09	2022-09-09	
Oil pollution prevention, type B annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Sewage pollution prevention renewal survey	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Air pollution prevention renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Air pollution prevention intermediate	Statutory	New York	2017-04-19	2021-03-09	2022-09-09	
Air pollution prevention annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Inventory of hazardous materials renewal survey	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Inventory of hazardous materials (EU regulation) renewal survey	Statutory			2024-03-09	2024-06-09	
Ballast water management certificate - treatment method renewal	Statutory	Zhoushan FIS	2019-08-20	2024-03-09	2024-06-09	
Ballast water management certificate - treatment method intermediate	Statutory	Barcelona	2017-09-10	2021-03-09	2022-09-09	
Ballast water management certificate - treatment method annual	Statutory	Lisbon FIS	2020-08-10	2021-03-09	2021-09-09	
Greek lifting appliances renewal survey	Statutory	Zhoushan FIS	2019-08-20	2024-08-20	2024-08-20	
Greek lifting appliances annual survey	Statutory	Lisbon FIS	2020-08-10	2021-05-20	2021-11-20	

▼ Conditions

No overdue conditions found

Yard

Hull yard:	Hyundai Heavy Ind. Co.,Ltd. (Hull number: 1979)
Outfitting yard:	Hyundai Heavy Ind. Co.,Ltd. (Hull number: 1979)
Contracted builder:	Hyundai Heavy Ind. Co.,Ltd. (Hull number: 1979)
Contract date:	2006-07-26
Keel laid:	2009-01-19
Launch:	2009-04-24
Date of build:	2009-06-09

Dimensions

Loa:	274 m
Lbp:	264 m
Lload:	265.169 m
Lwl:	
Bext:	48.004 m
B:	48 m
D:	23.1 m
Draught:	17.15 m
GT (ITC 69):	80,028
NT (ITC 69):	52,352
DWT:	158,267
GT (PRE 69):	
NT (PRE 69):	
Freeboard:	

Hull

Hull material:	Steel
Superstructures:	
Decks:	
Cargo tanks:	
Cargo capacity	
Grain:	
Bale:	
Liquid:	
Ore:	
Cargo holds:	
Cargo cranes:	
Hatchways:	
Hull recordings	
Hatch covers last inspected: (IMO requirement for bulk carriers)	
Number of	
Trans. bulkheads:	

Long. bulkheads:	
Other openings:	
Side openings:	
Anchor chain	
Length:	742,5
Diameter:	97
Material quality:	K3
Equipment letter:	Y-sh-r
Pump capacity:	4000
Pumps:	3
Pump rooms:	
Ballast capacity:	84616.9 m3
Sea and sanitary valves last opened up:	2019-08-20

Machinery

Main propulsion principle: Conventional propulsion - combustion engine

Barred speed range: 37-45

Component name	Product name	Designer name
Propeller, mono-block	Propeller, mono-block	HYUNDAI
Auxiliary boiler, exhaust gas heated (Economiser)	MISSION XW	Aalborg Industries AS
Propeller shaft arrangement		
Auxiliary boiler, oil/gas fired P	MISSION D-type	Aalborg Industries AS
Main electric power generator arrangements		
Intermediate shaft	Shaft	
Auxiliary boiler, oil/gas fired S	MISSION D-type	Aalborg Industries AS
Propulsion engine	6S70MC-C	MAN Energy Solutions
Steering gear	Steering gear	
Emergency generator engine	6CTA-8.3-D(M)	Cummins Inc.

BV: M/V ALPHA BRAVERY Vessel Register

8/17/2021 Equasis

SHIP NAME: ALPHA BRAVERY

28573K

IMO Nb: **9527910**

Flag: **Greece**

Ship Type (BV Notation): **Bulk carrier**

Status: **Active**

Class situation: **Classification after const.**

SHIP PARTICULARS **SHIP STATUS**

IDENTIFICATION

Register Number:	28573K
IMO Number:	9527910
Ship Name:	ALPHA BRAVERY
Ex-Ship Names:	CASSIOPEIA BULKER (2011)
Call Sign:	SVCC8
Type & service:	Bulk carrier
Owner:	MAJOR MARINE S.A.
Connecting District:	PIRAEUS (LPR)
Flag:	GREECE
Port of Registry:	PIRAEUS

CLASSIFICATION

Main Class Symbbols:	I ✠ Hull ✠ Mach
Service Notations:	Bulk carrier CSR CPS(WBT) BC-A ESP GRAB
Navigation Notations:	Unrestricted navigation
Additional Class Notation(s):	✠ AUT-UMS , MON-SHAFT , INWATERSURVEY

https://equasis.bureauveritas.com/#/ship/9527910/particulars 1/3

CLASSIFICATION

Equipment:	2(Ch 107 Q3)

DIMENSION

Gross Tonnage 69:	93715
Net Tonnage 69:	59411
Deadweight:	179398 ton
Overall Length:	292 m
LPP:	283 m
Breadth:	45 m
Depth:	24.75 m
Draught:	18.22 m
Freeboard:	6585 mm

HULL & CARGO

Builder:	HANJIN HEAVY INDUSTRIES & CONSTRUCTION CO., LTD.
Yard N°:	230
Hull Material:	Steel
Nb of Watertight Comp.:	9
Number of Cont. Decks:	1 1, Machinery Aft

HOLDS

Number of Holds:	9
Total Capacity of Holds:	199314.57

TANKS

LBC:	315191

MACHINERY

Propelling Type:	Diesel
Licence:	MAN B&W
Date of Build:	17 Aug 2010
Builder:	HYUNDAI HEAVY INDUSTRIES CO., LTD.
Place of Build (country):	Ulsan (KOR)

MACHINERY

POWER AND RATING

Total Power (kW):	18660 kW
Total Power (HP):	25353 HP

PROPELLING MACHINERY

Internal Combustion Engine:	(1) 2T - 6 cyl - 70.00 cm x 280.00 cm at 91 rpm

BOILERS

Boiler:	1 CHO 18.90 m² / 9.00 bar,1 CHR 49.00 m² / 12.00 bar

ELECTRICAL INSTALLATION

Frequency:	60 Hz
Diesel Generators:	3 - 925 kVA - 740 kW - 1073 HP
Emergency Generators:	1 - 250 kVA - 200 kW - 336 HP

PROPELLERS AND PROPELLERSHAFTS

Propelling system:	1 Screw Propeller Solid LB (oil -open) 5.00 at 91 rpm

SPEED OF THE SHIP

Speed:	15 kn

CAPACITY OF BUNKERS

Fuel Capacity:	5741.27 m³

BV: M/V ALPHA CHARM Vessel Register

SHIP NAME: ALPHA CHARM

30579Q

IMO Nb: **9827516**
Flag: **Greece**
Ship Type (BV Notation): **Bulk carrier**
Status: **Active**
Class situation: **Definitive classification**

SHIP PARTICULARS **SHIP STATUS**

IDENTIFICATION

Register Number:	30579Q
IMO Number:	9827516
Ship Name:	ALPHA CHARM
Call Sign:	SVDB5
Type & service:	Bulk carrier
Owner:	CARBON NAVIGATION S.A.
Connecting District:	PIRAEUS (LPR)
Flag:	GREECE
Port of Registry:	PIRAEUS

CLASSIFICATION

Main Class Symbbols:	I ✠ Hull ✠ Mach
Service Notations:	Bulk carrier CSR CPS(WBT) BC-A ESP GRAB
Navigation Notations:	Unrestricted navigation
Additional Class Notation(s):	ESA , GREEN PASSPORT EU , ✠ AUT-UMS , MON-SHAFT , BWE , BWT , CLEANSHIP , ERS-S , INWATERSURVEY

CLASSIFICATION

Equipment:	2(Ch 81 Q3)

DIMENSION

Gross Tonnage 69:	44114
Net Tonnage 69:	27557
Deadweight:	82052 ton
Overall Length:	229 m
LPP:	225.3 m
Breadth:	32.26 m
Depth:	20 m
Draught:	14.45 m
Freeboard:	7256 mm

HULL & CARGO

Builder:	Jiangsu New Yangzi Shipbuilding Co.,Ltd.
Country of build:	CHINA
Date of Build:	31 Oct 2018
Yard N°:	YZJ2015-2216
Hull Material:	Steel
Nb of Watertight Comp.:	9
Number of Cont. Decks:	1 1, Machinery Aft

HOLDS

Number of Holds:	7
Total Capacity of Holds:	97738.40

TANKS

LBC:	145364

MACHINERY

Propelling Type:	Diesel
Licence:	MAN B&W
Date of Build:	07 Aug 2018
Builder:	DALIAN MARINE DIESEL CO., LTD

MACHINERY

Place of Build (country):	Dalian Marine Diesel Works, No.1 Hai Fang Street, Dalian (CHN)

POWER AND RATING

Total Power (kW):	9801 kW
Total Power (HP):	13317 HP

PROPELLING MACHINERY

Internal Combustion Engine:	(1) 2T - 6 cyl - 60.00 cm x 240.00 cm at 90 rpm

BOILERS

Boiler:	1 CHM DEU/17/01541 1.00 m² / 6.00 bar

ELECTRICAL INSTALLATION

Frequency:	60 Hz
Diesel Generators:	3 - 788 kVA - 630 kW - 938 HP
Emergency Generators:	1 - 188 kVA - 150 kW - 204 HP

PROPELLERS AND PROPELLERSHAFTS

Propelling system:	1 Screw Propeller Solid LB (oil -closed) 10.00 at 90 rpm

SPEED OF THE SHIP

Speed:	14.3 kn

CAPACITY OF BUNKERS

Fuel Capacity:	2653.2 m³

4.2 NOON REPORTS

Sea-going vessels are sending everyday a noon report to their management companies, which they contain useful data and parameters of the daily procedures on-board. This way companies are having a clear view and keeping a track of vessel's essential services. Usually containing information about fuel consumption, engine loads, pressures and temperatures of essential equipment (boiler, generators, pumps, etc.) and other operations, noon reports are very important for interaction between shore and vessel and in many cases are acting preventively and proactively.

Vessel's Chief Engineer(C/E) is responsible for preparing the report and it is sent by the Master to the shore management company at a fixed time on daily basis. A Deck Officer assists the C/E in providing the required data, used to complete the noon report. Master has the overall review and responsibility to ensure that noon report is well prepared and sent on time. Normally it is sent during noon, hence it is called noon report.

Below is a general overview of the content of a noon report and how they are recorded:

- Ship's Name: Name or Call sign of the ship
- Voyage number: Every noon report comes with the current voyage number where the ship is plying
- Date of the report: Date of noon report
- Time of the report: Time of noon report. Chief engineer and ship staff must ensure that the noon report is sent daily at same time or
- Position of the ship: The position of ship taken from GPS of the ship in Latitude and Longitude at the time of noon (or time of report preparation)
- Average speed done since last submitted noon report in knots: The average speed is calculated out from the net speed of the ship in knots since last noon report
- Propeller Slip: The total revolutions of the propeller from noon to noon is obtained using revolution counter. The engine distance can be calculated using the pitch of the propeller provided by the manufacturer.
- Average RPM: Average RPM Of the propulsion engine/ engines

- Wind Direction and wind force: The force and direction of the wind
- Sea and swell condition: General Sea and swell condition at the time of report preparation
- Distance to Next Port of call/ destination: The distance which the ship needs to cover to reach the next port
- Estimated Time of Arrival: The Deck officer will calculate the ETA for the next port of call
- R.O.B: Following "Remaining on board" are prepared by the chief engineer where he/she takes account of either all Fuel oil/lube oil/water present on board ship or excluding the oil/water which are in the daily consumption or service tanks to keep a safe margin
    - Fresh Water in MT
    - Fuel Oil in MT
    - LSFO in MT
    - Diesel oil in MT
    - LSDO in MT
    - Lube oil for ME in MT
    - Lube oil for Generator in MT
    - Hydraulic oil in MT

Of course, there is no standard form of the report and could contain any data or useful feedback shipping company can use for best reference.

The noon report is usually used to analyze the following parameters and performance:

– Consumption of fuel and lube on daily basis

– Total weight of cargo carried

– Distance covered from last port

– Distance to be covered for next port call

– Time taken to complete the passage

– Time taken for port operation

– To order fuel/ lube oil as required

– To order fresh water as required

– To calculate the Energy Efficiency Operation Indicator

In current thesis, data need to be examined are fuel consumption, kW of auxiliary engines and running time of engines during berthing. Thus, we asked for noon reports received by vessels during their stay at ports, known as in-port noon report. We managed to obtain data of two in-ports reports for each vessel of different duration of stay. Both companies' noon reports were extracted by their ERP system and sent to us in their initial form.

Upon receiving the in-port reports from the companies, data were cleansed and analyzed in order to retrieve these we are interested in and will be presented below, for each vessel separately.

4.2.1 M/T CAESAR NOON REPORT

M/T CAESAR is a crude oil tanker built on 2009 carrying Malta flag. It is a Very Large Crude Carrier (VLCC) with 158536 gross tonnage (GRT). Due to their size, VLCCs are very important

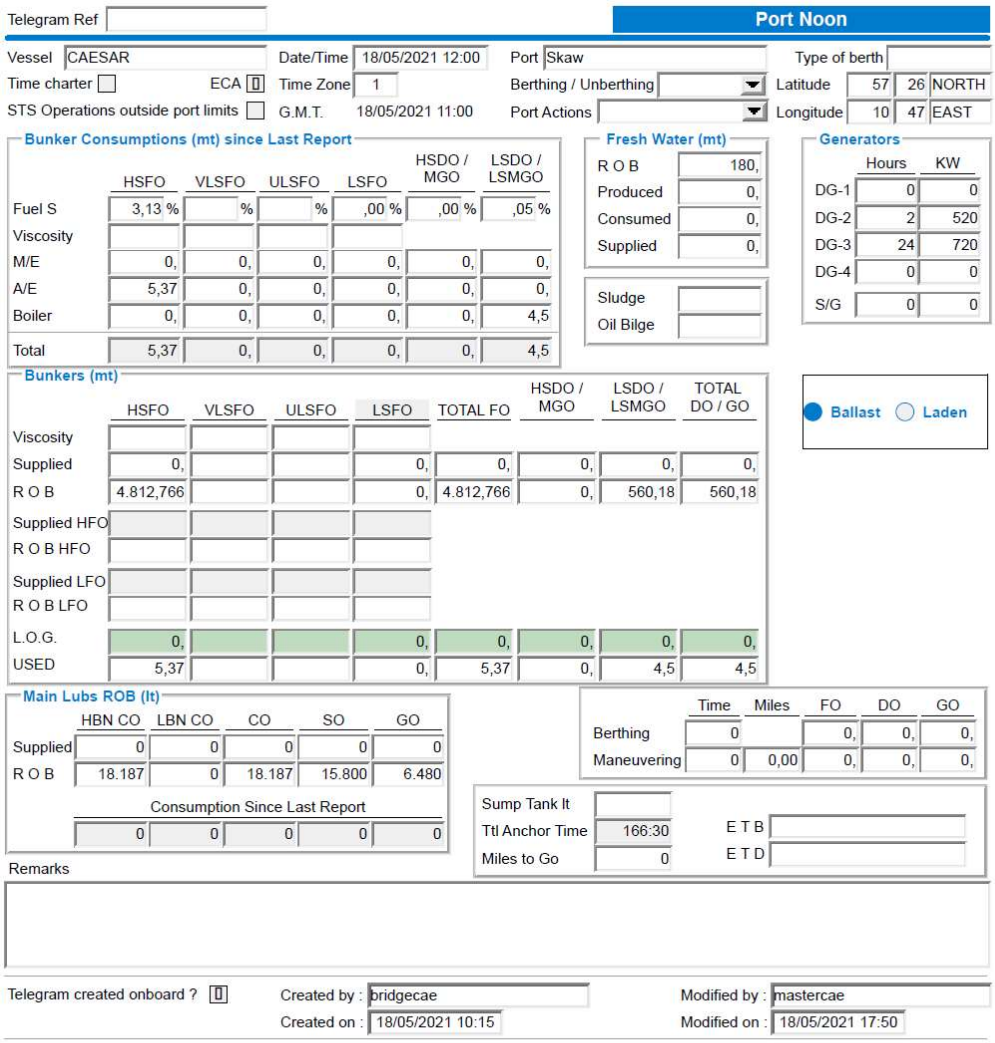
M/T CAESAR during cargo operation

in the shipping industry as they can carry huge amount of crude oil in their cargo holds, across the oceans and seas. They are also known, with ULCC, as ‘supertankers.

First in-port noon report is during her stay at Port of Skaw, Denmark where vessel stayed for six days, from 18 May 2021 - 23 May 2021 for loading purposes. While, the other report is during her berthing at Port of Daesan, South Korean with three days duration of stay, from 8 February 2021 – 10 February 2021, for discharging operation.

Below are attached the in-port noon reports, as these were received.

4.2.1.1 PORT: SKAW, DENMARK



Telegram Ref

Port Noon

Vessel	CAESAR	Date/Time	18/05/2021 12:00	Port	Skaw	Type of berth	
Time charter ☐	ECA ☒	Time Zone	1	Berthing / Unberthing		Latitude	57 26 NORTH
STS Operations outside port limits ☐		G.M.T.	18/05/2021 11:00	Port Actions		Longitude	10 47 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,13 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	5,37	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,5
Total	5,37	0,	0,	0,	0,	4,5

Fresh Water (mt)

R O B	180,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	2	520
DG-3	24	720
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.812,766			0,	4.812,766	0,	560,18	560,18
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	5,37			0,	5,37	0,	4,5	4,5

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.480
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	166:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☒

Created by : bridgecae
Created on : 18/05/2021 10:15

Modified by : mastercae
Modified on : 18/05/2021 17:50

Telegram Ref

Port Noon

Vessel: CAESAR | Date/Time: 19/05/2021 12:00 | Port: Skaw | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 2 | Berthing / Unberthing: | Latitude: 57 26 NORTH
STS Operations outside port limits ☐ | G.M.T.: 19/05/2021 10:00 | Port Actions: | Longitude: 10 48 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,13 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	5,37	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,4
Total	5,37	0,	0,	0,	0,	4,4

Fresh Water (mt)

R O B	170,
Produced	0,
Consumed	10,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	3	510
DG-3	24	630
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.807,396			0,	4.807,396	0,	555,78	555,78
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	5,37			0,	5,37	0,	4,4	4,4

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.380
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	190:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☒
Created by : bridgecae | Modified by : mastercae
Created on : 19/05/2021 09:29 | Modified on : 19/05/2021 16:51

Telegram Ref

Port Noon

Vessel: CAESAR | Date/Time: 20/05/2021 12:00 | Port: Skaw | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 2 | Berthing / Unberthing: | Latitude: 57 26 NORTH
STS Operations outside port limits ☐ | G.M.T. 20/05/2021 10:00 | Port Actions: | Longitude: 10 48 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,13 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	5,3	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,32
Total	5,3	0,	0,	0,	0,	4,32

Fresh Water (mt)

R O B	160,
Produced	0,
Consumed	10,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	500
DG-3	9	500
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.802,096			0,	4.802,096	0,	551,46	551,46
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	5,3			0,	5,3	0,	4,32	4,32

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.260
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	214:30
Miles to Go	0

E T B
E T D

Remarks

Telegram created onboard ? ☒

Created by : bridgecae | Modified by : mastercae
Created on : 20/05/2021 09:33 | Modified on : 20/05/2021 11:04

Telegram Ref

Port Noon

Vessel: CAESAR | Date/Time: 21/05/2021 12:00 | Port: Skaw | Type of berth:
Time charter ☐ | ECA ☐ | Time Zone: 2 | Berthing / Unberthing: | Latitude: 57 26 NORTH
STS Operations outside port limits ☐ | G.M.T. 21/05/2021 10:00 | Port Actions: | Longitude: 10 47 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,13 %	%	%	,00 %	,00 %	,09 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	5,56	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,43
Total	5,56	0,	0,	0,	0,	4,43

Fresh Water (mt)

R O B	150,
Produced	0,
Consumed	10,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	20	500
DG-3	24	500
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.796,536			0,	4.796,536	0,	547,03	547,03
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	5,56			0,	5,56	0,	4,43	4,43

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.130
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	238:30
Miles to Go	0

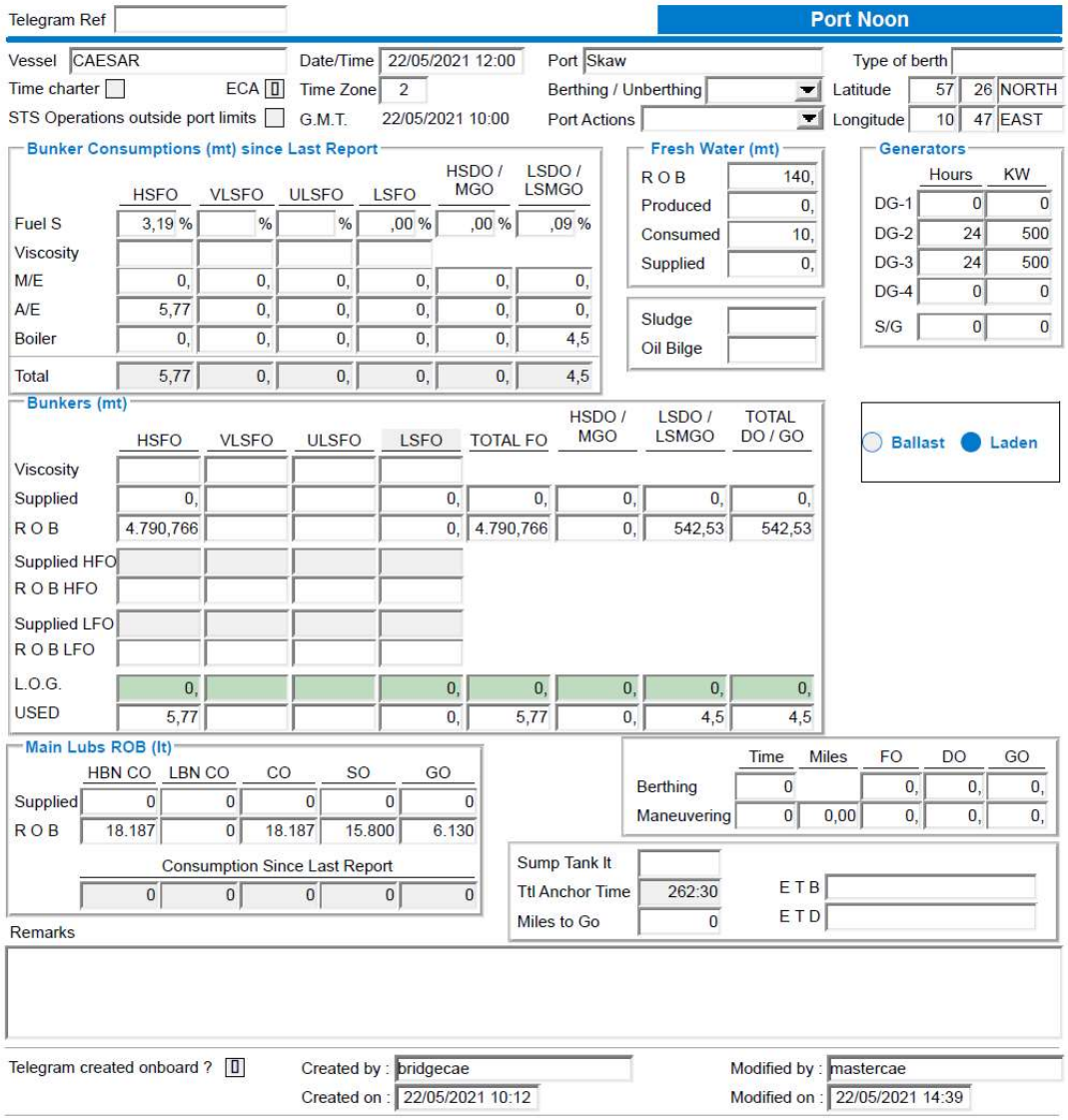
E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgecae | Created on : 21/05/2021 10:05

Modified by : mastercae | Modified on : 21/05/2021 12:06



Telegram Ref

Port Noon

Vessel	CAESAR	Date/Time	22/05/2021 12:00	Port	Skaw	Type of berth			
Time charter ☐	ECA ☒	Time Zone	2	Berthing / Unberthing		Latitude	57	26	NORTH
STS Operations outside port limits ☐		G.M.T.	22/05/2021 10:00	Port Actions		Longitude	10	47	EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,19 %	%	%	,00 %	,00 %	,09 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	5,77	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,5
Total	5,77	0,	0,	0,	0,	4,5

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	10,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	500
DG-3	24	500
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.790,766			0,	4.790,766	0,	542,53	542,53
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	5,77			0,	5,77	0,	4,5	4,5

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.130
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

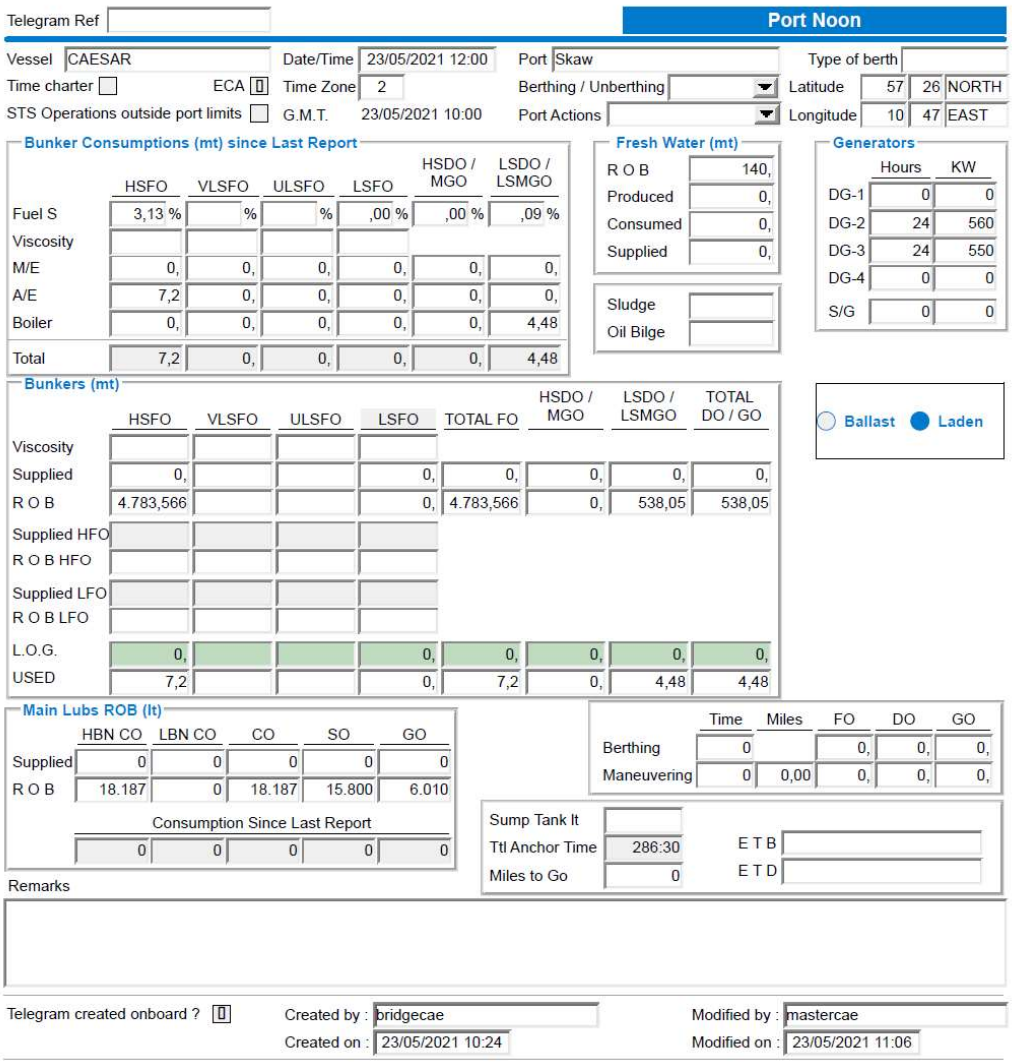
Sump Tank lt			
Ttl Anchor Time	262:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgecae
Created on : 22/05/2021 10:12

Modified by : mastercae
Modified on : 22/05/2021 14:39



Telegram Ref

Port Noon

Vessel: CAESAR | Date/Time: 23/05/2021 12:00 | Port: Skaw | Type of berth:
Time charter: ☐ | ECA: ☐ | Time Zone: 2 | Berthing / Unberthing: | Latitude: 57 26 NORTH
STS Operations outside port limits: ☐ | G.M.T.: 23/05/2021 10:00 | Port Actions: | Longitude: 10 47 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,13 %	%	%	,00 %	,00 %	,09 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	7,2	0,	0,	0,	0,	0,
Boiler	0,	0,	0,	0,	0,	4,48
Total	7,2	0,	0,	0,	0,	4,48

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	560
DG-3	24	550
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	4.783,566			0,	4.783,566	0,	538,05	538,05
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	7,2			0,	7,2	0,	4,48	4,48

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	18.187	0	18.187	15.800	6.010
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	286:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgecae | Modified by : mastercae
Created on : 23/05/2021 10:24 | Modified on : 23/05/2021 11:06

4.2.1.2 PORT: DAESAN, SOUTH KOREA

Port Noon

Vessel	CAESAR	Date/Time	08/02/2021 12:00	From Port	Acu		Latitude	37 00 NORTH
Voyage	V 62L	Time Zone	9	To Port	Daesan	KRTSN	Longitude	126 16 EAST
Cargo MT	276.874	G.M.T.	08/02/2021 03:00	Berthing / Unberthing				ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Remarks

Drafts FWD/MEAN/AFT	20,76 /	20,76 /	20,76
Wind Direction / Force	N /	5	Bft
Sea Water Temp		6	
Main Condenser Vacuum			
Amver Notification	☐		

Generators

	Hours	KW
DG-1	24	600
DG-2	0	0
DG-3	24	600
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	300,	270
Consumed	25,	0
Supplied	0,	0

○ Ballast ● Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	4,2	0,	0,	0,	0,	0,	4,2
INWARD	4,8	0,	1,4	0,	0,	0,	0,	0,	6,2
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	4,8	0,	5,6	0,	0,	0,	0,	0,	

	From Date	To Date
	07/02/2021 16:30	08/02/2021 12:00
	07/02/2021 12:00	07/02/2021 16:30

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,	0,	0,	0,	3,9	0,	0,	3,9
INWARD	0,	0,	0,	0,	0,	0,6	0,	0,	0,6
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	0,	0,	4,5	0,	0,	

Fuel Sulphur (%)

HSFO	3,33
LSFO	0,00
HSDO	0,00
LSDO	0,07

Revolution Counter 26.278.927

In Service

	Hours
Cargo Pump 1 ☐	0,0
Cargo Pump 2 ☐	0,0
Cargo Pump 3 ☐	0,0
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	573,08	8,61	581,69	0,	183,1	183,1
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	16.237	0	16.237	11.300	0	0
Supplied	0	0	0	0	0	
Cons.	48	0	48	0	0	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

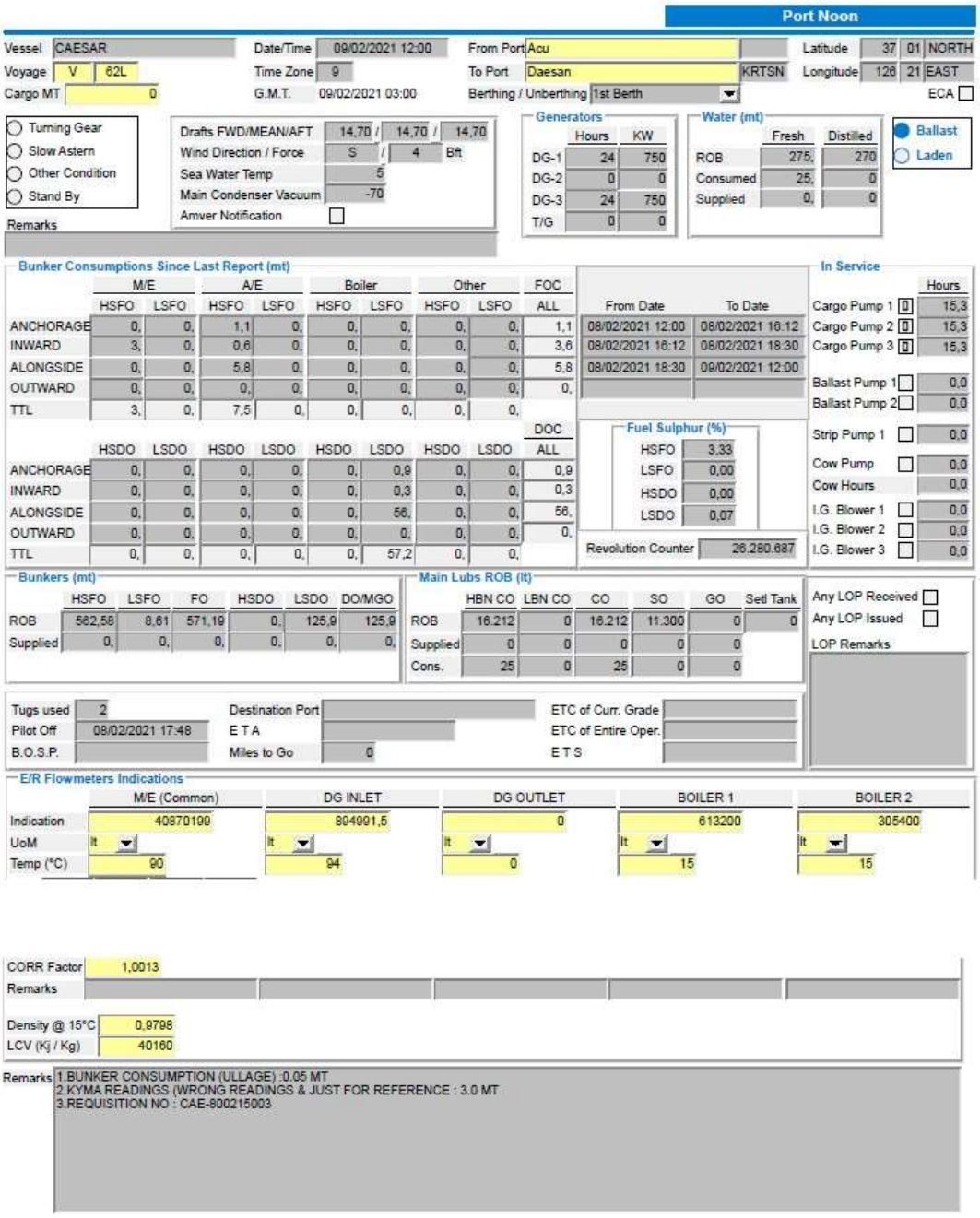
Tugs used	0	Destination Port		ETC of Curr. Grade	
Pilot Off	07/02/2021 16:36	E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	40870152	886860,56	0	5744400	282300
UoM	lt	lt	lt	lt	lt
Temp (°C)	90	94	0	20	20

CORR Factor	1,0013
Remarks	
Density @ 15°C	0,9798
LCV (Kj / Kg)	40160

Remarks
1.BUNKER CONSUMPTION (ULLAGE) :4.8 MT
2.KYMA READINGS (WRONG READINGS & JUST FOR REFERENCE : 1.2 MT
3.REQUISITION NO : CAE-800215003



Port Noon

Vessel	CAESAR	Date/Time	09/02/2021 12:00	From Port	Acu		Latitude	37 01	NORTH
Voyage	V 62L	Time Zone	9	To Port	Daesan	KRTSN	Longitude	126 21	EAST
Cargo MT	0	G.M.T.	09/02/2021 03:00	Berthing / Unberthing	1st Berth				ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Drafts FWD/MEAN/AFT	14,70 /	14,70 /	14,70
Wind Direction / Force	S /	4	Bft
Sea Water Temp	5		
Main Condenser Vacuum	-70		
Amver Notification	☐		

Remarks

Generators

	Hours	KW
DG-1	24	750
DG-2	0	0
DG-3	24	750
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	275,	270
Consumed	25,	0
Supplied	0,	0

● Ballast ○ Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	1,1	0,	0,	0,	0,	0,	1,1
INWARD	3,	0,	0,6	0,	0,	0,	0,	0,	3,6
ALONGSIDE	0,	0,	5,8	0,	0,	0,	0,	0,	5,8
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	3,	0,	7,5	0,	0,	0,	0,	0,	

	From Date	To Date
ANCHORAGE	08/02/2021 12:00	08/02/2021 16:12
INWARD	08/02/2021 16:12	08/02/2021 18:30
ALONGSIDE	08/02/2021 18:30	09/02/2021 12:00
OUTWARD		
TTL		

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,9	0,	0,	0,9
INWARD	0,	0,	0,	0,	0,	0,3	0,	0,	0,3
ALONGSIDE	0,	0,	0,	0,	0,	56,	0,	0,	56,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	0,	0,	57,2	0,	0,	

Fuel Sulphur (%)

HSFO	3,33
LSFO	0,00
HSDO	0,00
LSDO	0,07

Revolution Counter 26.280.687

In Service

	Hours
Cargo Pump 1 ☐	15,3
Cargo Pump 2 ☐	15,3
Cargo Pump 3 ☐	15,3
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	562,58	8,61	571,19	0,	125,9	125,9
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	16.212	0	16.212	11.300	0	0
Supplied	0	0	0	0	0	
Cons.	25	0	25	0	0	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

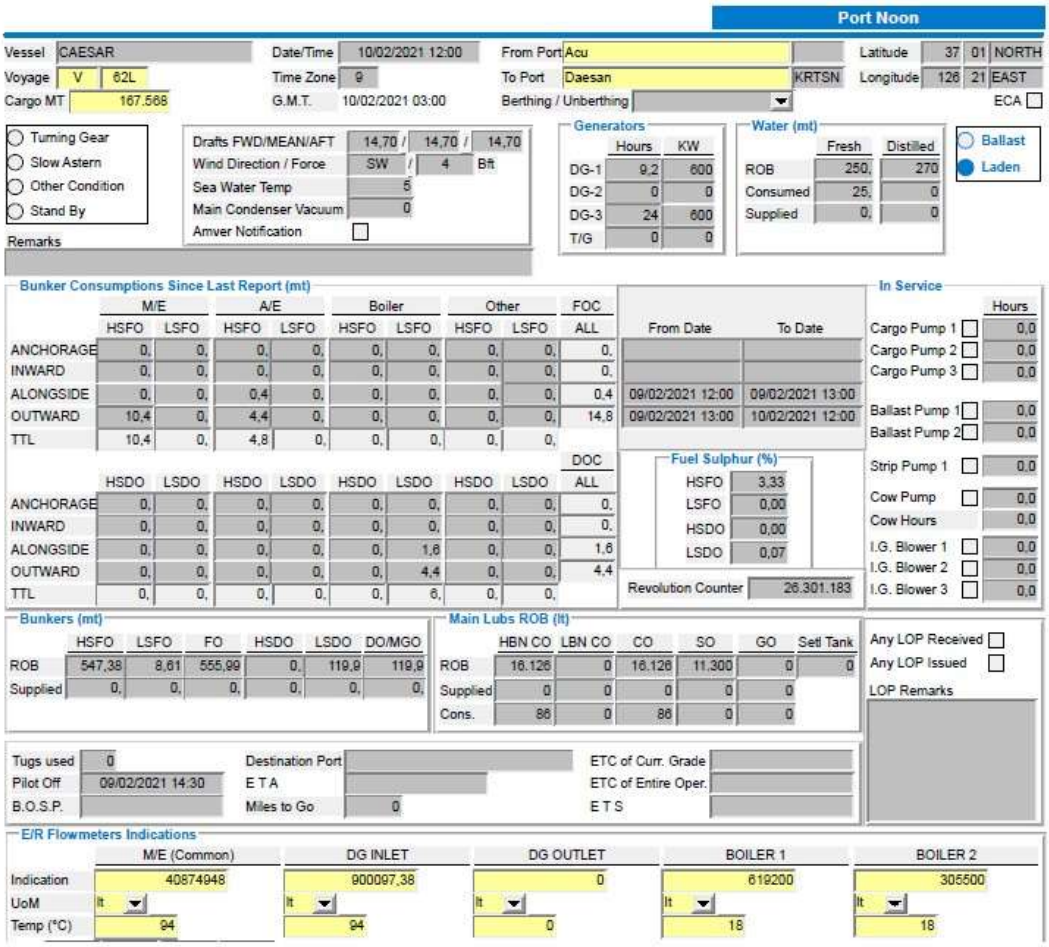
Tugs used	2	Destination Port		ETC of Curr. Grade	
Pilot Off	08/02/2021 17:48	E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	40870199	894991,5	0	613200	305400
UoM	lt	lt	lt	lt	lt
Temp (°C)	90	94	0	15	15

CORR Factor	1,0013
Remarks	
Density @ 15°C	0,9798
LCV (Kj / Kg)	40160

Remarks
1.BUNKER CONSUMPTION (ULLAGE) :0.05 MT
2.KYMA READINGS (WRONG READINGS & JUST FOR REFERENCE : 3.0 MT
3.REQUISITION NO : CAE-800215003



Port Noon

Vessel	CAESAR	Date/Time	10/02/2021 12:00	From Port	Acu		Latitude	37	01 NORTH
Voyage	V 62L	Time Zone	0	To Port	Daesan	KRTSN	Longitude	126	21 EAST
Cargo MT	167.568	G.M.T.	10/02/2021 03:00	Berthing / Unberthing					ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Remarks

Drafts FWD/MEAN/AFT	14,70 /	14,70 /	14,70
Wind Direction / Force	SW /	4	Bft
Sea Water Temp	6		
Main Condenser Vacuum	0		
Amver Notification	☐		

Generators

	Hours	KW
DG-1	9,2	600
DG-2	0	0
DG-3	24	600
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	250,	270
Consumed	25,	0
Supplied	0,	0

○ Ballast ● Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,4	0,	0,	0,	0,	0,	0,4
OUTWARD	10,4	0,	4,4	0,	0,	0,	0,	0,	14,8
TTL	10,4	0,	4,8	0,	0,	0,	0,	0,	

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,	0,	0,	1,6	0,	0,	1,6
OUTWARD	0,	0,	0,	0,	0,	4,4	0,	0,	4,4
TTL	0,	0,	0,	0,	0,	6,	0,	0,	

From Date	To Date
09/02/2021 12:00	09/02/2021 13:00
09/02/2021 13:00	10/02/2021 12:00

Fuel Sulphur (%)

HSFO	3,33
LSFO	0,00
HSDO	0,00
LSDO	0,07

Revolution Counter 26.301.183

In Service

	Hours
Cargo Pump 1 ☐	0,0
Cargo Pump 2 ☐	0,0
Cargo Pump 3 ☐	0,0
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	547,38	8,61	555,99	0,	119,9	119,9
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

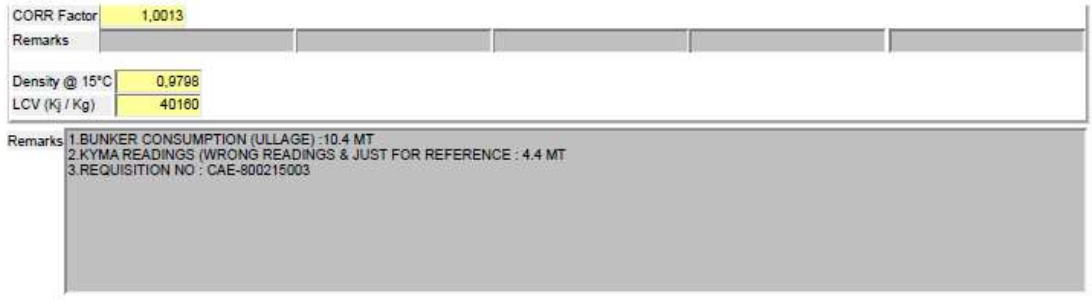
	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	16.126	0	16.126	11.300	0	0
Supplied	0	0	0	0	0	
Cons.	86	0	86	0	0	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

Tugs used	0	Destination Port		ETC of Curr. Grade	
Pilot Off	09/02/2021 14:30	E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	40874948	900097,38	0	619200	305500
UoM	lt	lt	lt	lt	lt
Temp (°C)	94	94	0	18	18



CORR Factor	1,0013
Remarks	
Density @ 15°C	0,9798
LCV (Kj / Kg)	40160

Remarks
1.BUNKER CONSUMPTION (ULLAGE) :10.4 MT
2.KYMA READINGS (WRONG READINGS & JUST FOR REFERENCE : 4.4 MT
3.REQUISITION NO : CAE-800215003

4.2.2 M/T PEGASUS NOON REPORT

M/T PEGASUS is a Crude Oil Tanker built on 2009, flying on a Greek flag. Vessel's GRT is 80028. She belongs in the Suezmax tankers which, in naval architecture terms, are the largest ship measurements capable of transiting the Suez Canal in a laden condition. These tankers have a capacity of 120.000 – 200.000 DWT and they can carry approx. 800.000 - 1.000.000 oil barrels. Suezmax tankers can reach their Atlantic destinations via the Suez Canal, whereas ULCC and all but the lightest VLCCs have to round the Cape of Good Hope.

First in-port noon report is during her stay at Port of Zhanjiang in China where vessel stayed for six days, from 3 March 2021 - 8 March 2021 for discharging operation. While, the other report is during her berthing at Port Fos Sur Mer, France with three days duration of stay, from 22 December 2020 – 24 December 2020, for discharging operation.

M/T Pegasus

4.2.2.1 PORT: ZHANJIANG, CHINA

Telegram Ref

Port Noon

Vessel: PEGASUS | Date/Time: 03/03/2021 12:00 | Port: ZHANJIANG | Type of berth:
Time charter ☐ | ECA ☐ | Time Zone: 8 | Berthing / Unberthing: 1st Berth | Latitude: 20 54 NORTH
STS Operations outside port limits ☐ | G.M.T.: 03/03/2021 04:00 | Port Actions: | Longitude: 110 52 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	1,2
A/E	0,	0,	0,	0,	0,	1,3
Boiler	0,	0,	0,	0,	0,	1,7
Total	0,	0,	0,	0,	0,	4,2

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	1	380
DG-2	1	380
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	368,979	368,979
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	4,2	4,2

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.890	0	12.890	18.830	3.300
Consumption Since Last Report	0	0	0	0	0

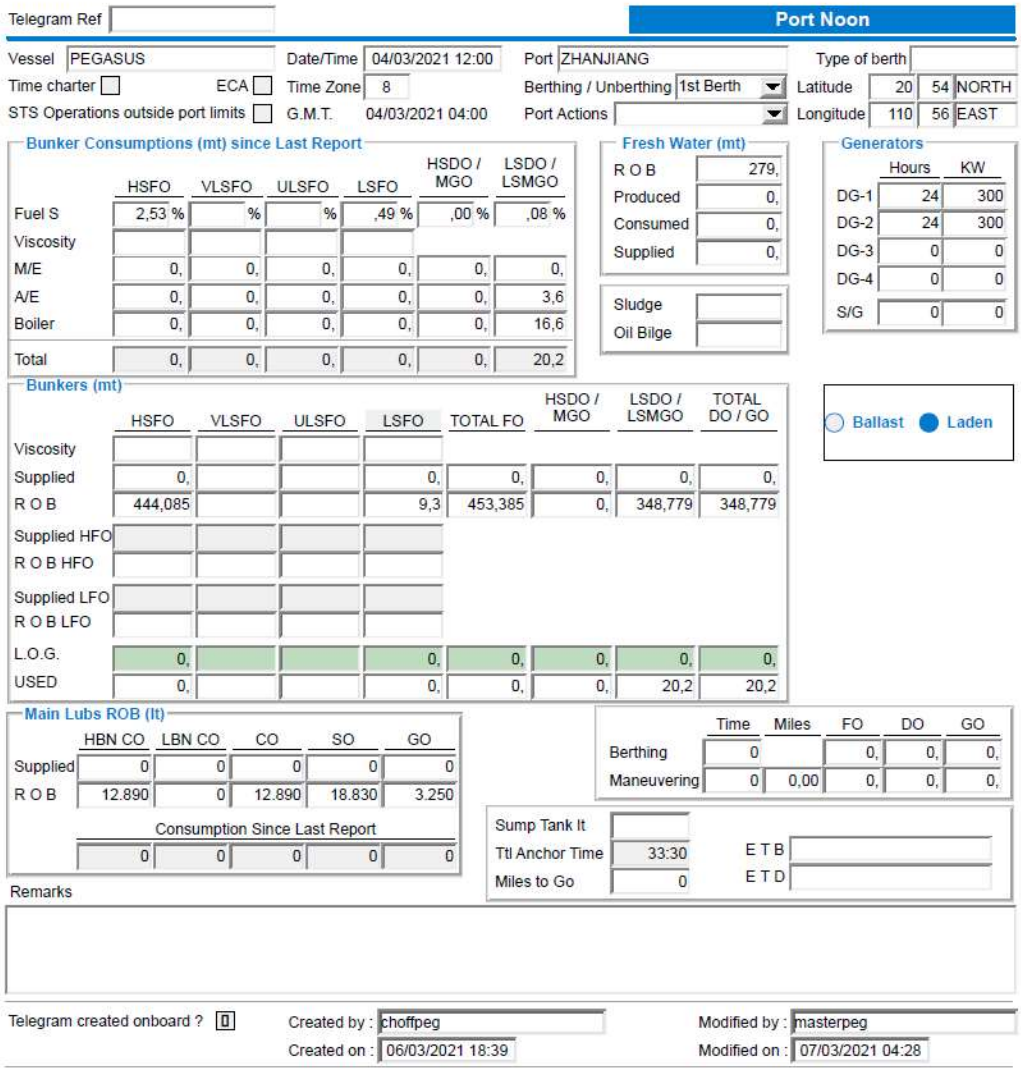
	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	9:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : choffpeg | Modified by : masterpeg
Created on : 06/03/2021 05:58 | Modified on : 07/03/2021 04:28



Telegram Ref

Port Noon

Vessel: PEGASUS | Date/Time: 04/03/2021 12:00 | Port: ZHANJIANG | Type of berth:
Time charter ☐ | ECA ☐ | Time Zone: 8 | Berthing / Unberthing: 1st Berth | Latitude: 20 54 NORTH
STS Operations outside port limits ☐ | G.M.T.: 04/03/2021 04:00 | Port Actions: | Longitude: 110 56 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	3,6
Boiler	0,	0,	0,	0,	0,	16,6
Total	0,	0,	0,	0,	0,	20,2

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	300
DG-2	24	300
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	348,779	348,779
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	20,2	20,2

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.890	0	12.890	18.830	3.250
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	33:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : choffpeg | Modified by : masterpeg
Created on : 06/03/2021 18:39 | Modified on : 07/03/2021 04:28

Telegram Ref

Port Noon

Vessel	PEGASUS	Date/Time	05/03/2021 12:00	Port	ZHANJIANG	Type of berth			
Time charter ☐	ECA ☐	Time Zone	8	Berthing / Unberthing	1st Berth	Latitude	20	54	NORTH
STS Operations outside port limits ☐		G.M.T.	05/03/2021 04:00	Port Actions		Longitude	110	56	EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	1,8
A/E	0,	0,	0,	0,	0,	3,6
Boiler	0,	0,	0,	0,	0,	7,9
Total	0,	0,	0,	0,	0,	13,3

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	380
DG-2	24	380
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	335,479	335,479
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	13,3	13,3

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.880	0	12.880	18.830	3.200
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

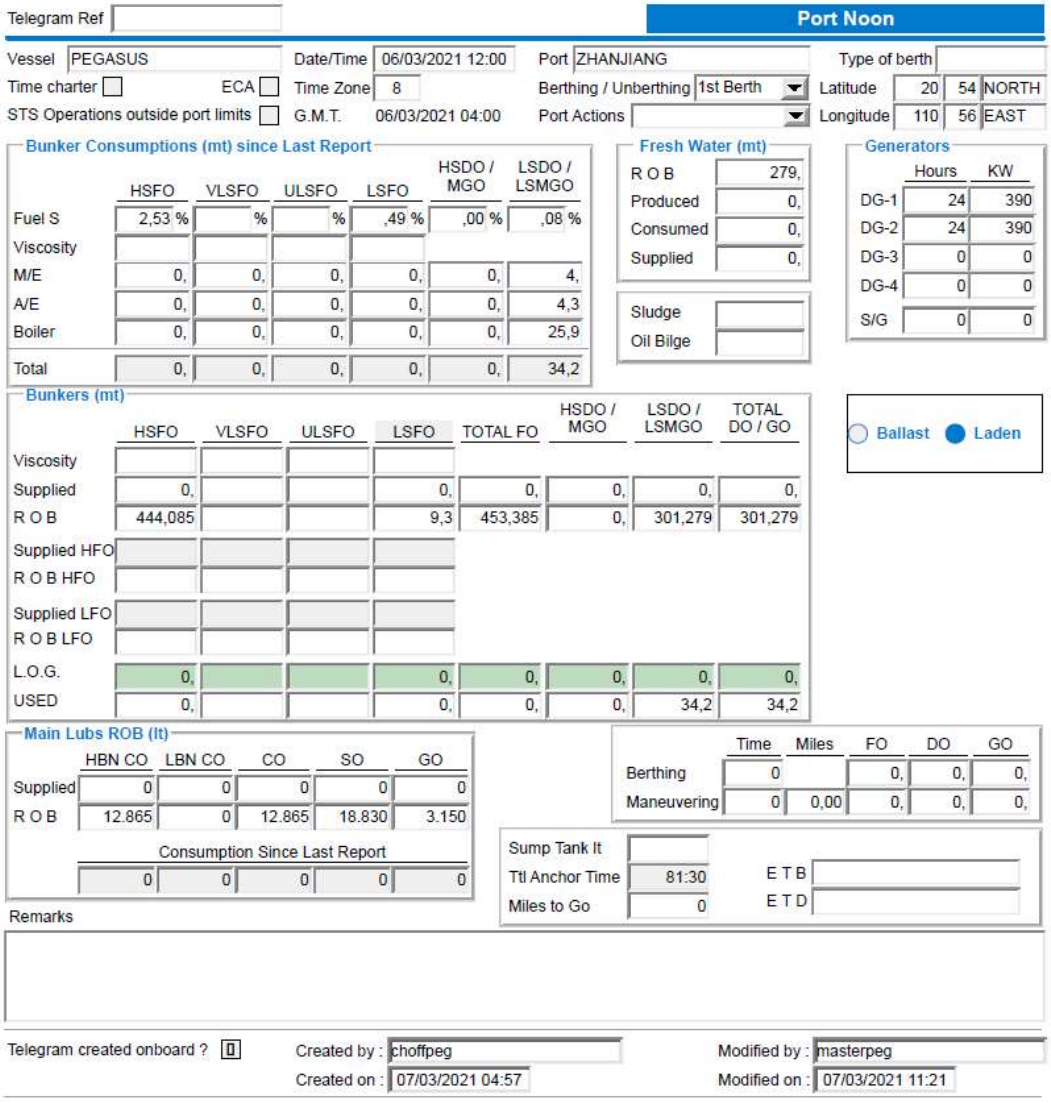
Sump Tank lt			
Ttl Anchor Time	57:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : choffpeg
Created on : 07/03/2021 04:13

Modified by : masterpeg
Modified on : 07/03/2021 11:21



Telegram Ref

Port Noon

Vessel	PEGASUS	Date/Time	06/03/2021 12:00	Port	ZHANJIANG	Type of berth		
Time charter ☐	ECA ☐	Time Zone	8	Berthing / Unberthing	1st Berth	Latitude	20 54	NORTH
STS Operations outside port limits ☐		G.M.T.	06/03/2021 04:00	Port Actions		Longitude	110 56	EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	4,
A/E	0,	0,	0,	0,	0,	4,3
Boiler	0,	0,	0,	0,	0,	25,9
Total	0,	0,	0,	0,	0,	34,2

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	390
DG-2	24	390
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	301,279	301,279
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	34,2	34,2

◯ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.865	0	12.865	18.830	3.150
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

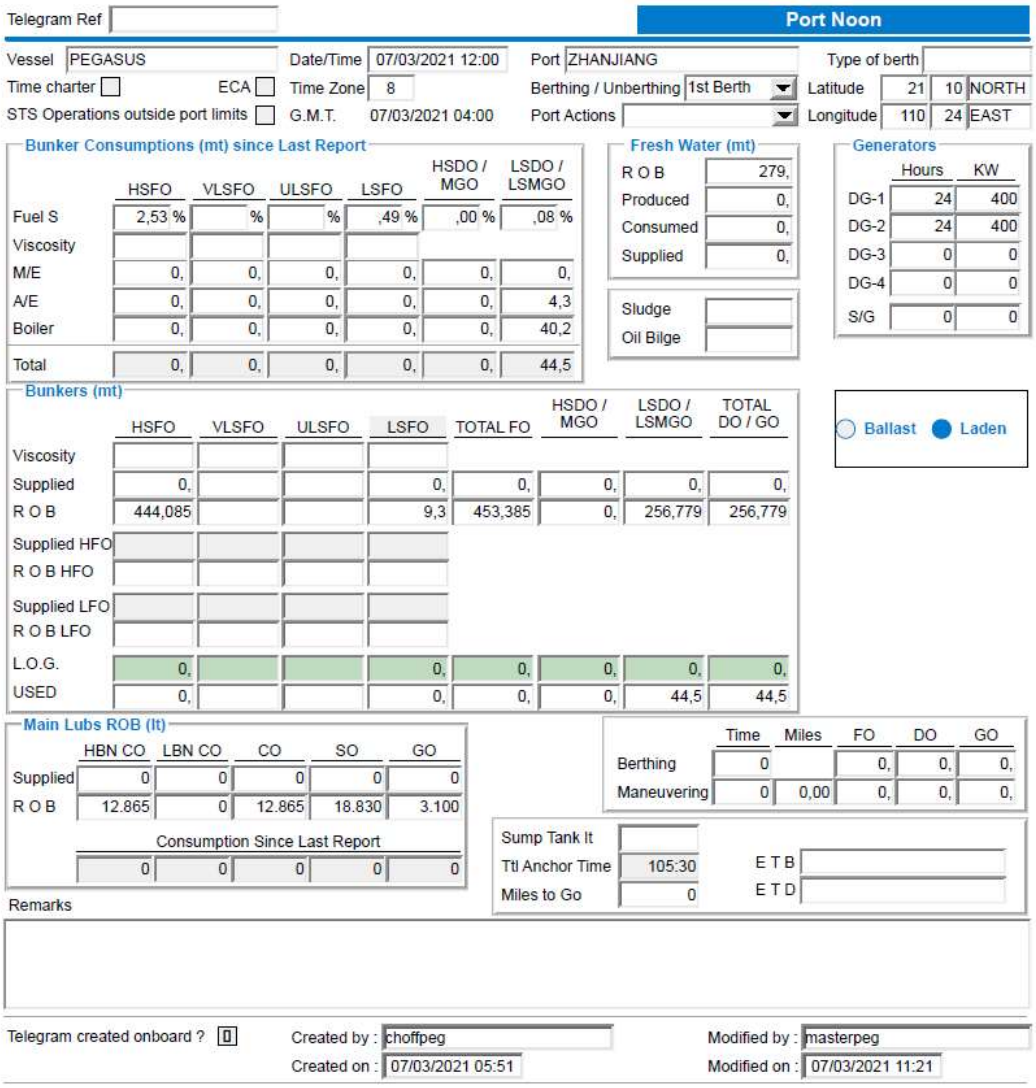
Sump Tank lt			
Ttl Anchor Time	81:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : choffpeg
Created on : 07/03/2021 04:57

Modified by : masterpeg
Modified on : 07/03/2021 11:21



Telegram Ref

Port Noon

Vessel	PEGASUS	Date/Time	07/03/2021 12:00	Port	ZHANJIANG	Type of berth			
Time charter ☐	ECA ☐	Time Zone	8	Berthing / Unberthing	1st Berth	Latitude	21	10	NORTH
STS Operations outside port limits ☐		G.M.T.	07/03/2021 04:00	Port Actions		Longitude	110	24	EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	4,3
Boiler	0,	0,	0,	0,	0,	40,2
Total	0,	0,	0,	0,	0,	44,5

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	400
DG-2	24	400
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	256,779	256,779
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	44,5	44,5

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.865	0	12.865	18.830	3.100
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	105:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : choffpeg
Created on : 07/03/2021 05:51

Modified by : masterpeg
Modified on : 07/03/2021 11:21

Telegram Ref

Port Noon

Vessel PEGASUS | Date/Time 08/03/2021 12:00 | Port ZHANJIANG | Type of berth

Time charter ☐ | ECA ☐ | Time Zone 8 | Berthing / Unberthing 1st Berth | Latitude 20 58 NORTH

STS Operations outside port limits ☐ | G.M.T. 08/03/2021 04:00 | Port Actions | Longitude 110 56 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	2,53 %	%	%	,49 %	,00 %	,08 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	4,
Boiler	0,	0,	0,	0,	0,	31,2
Total	0,	0,	0,	0,	0,	35,2

Fresh Water (mt)

R O B	279,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	23	390
DG-2	24	390
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	444,085			9,3	453,385	0,	221,579	221,579
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0,	0,	35,2	35,2

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12.865	0	12.865	18.830	3.050
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	129:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgepeg | Created on : 09/03/2021 04:13

Modified by : masterpeg | Modified on : 11/03/2021 05:37

4.2.2.1 PORT: FOS SUR MER, FRANCE

Port Noon

Vessel	PEGASUS	Date/Time	22/12/2020 12:00	From Port	Las Palmas	ESLPA	Latitude	43	24	NORTH
Voyage	V 86L	Time Zone	1	To Port	Fos	FRFOS	Longitude	004	53	EAST
Cargo MT	123.865	G.M.T.	22/12/2020 11:00	Berthing / Unberthing	At Port					ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Remarks

Drafts FWD/MEAN/AFT	14,57 /	14,57 /	14,57
Wind Direction / Force	N-NW /	3	Bft
Sea Water Temp	15		
Main Condenser Vacuum	0		
Amver Notification	☐		

Generators

	Hours	KW
DG-1	19	300
DG-2	3	300
DG-3	19	300
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	40,	131
Consumed	6,	0
Supplied	0,	0

○ Ballast ● Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	0,	0,	0,	0,	0,	

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,51	0,	3,21	0,	3,2	0,	0,	6,92
INWARD	0,	0,6	0,	0,3	0,	0,1	0,	0,	1,
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	1,11	0,	3,51	0,	3,3	0,	0,	

From Date	To Date
21/12/2020 17:00	22/12/2020 12:00
21/12/2020 15:30	21/12/2020 17:00

Fuel Sulphur (%)

HSFO	2,98
LSFO	0,49
HSDO	0,00
LSDO	0,08

Revolution Counter 158.514.722

In Service

	Hours
Cargo Pump 1 ☐	0,0
Cargo Pump 2 ☐	0,0
Cargo Pump 3 ☐	0,0
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	312,75	9,5	322,25	0,	238,78	238,78
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	14.875	0	14.875	13.170	2.360	0
Supplied	0	0	0	0	0	
Cons.	20	0	20	600	80	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

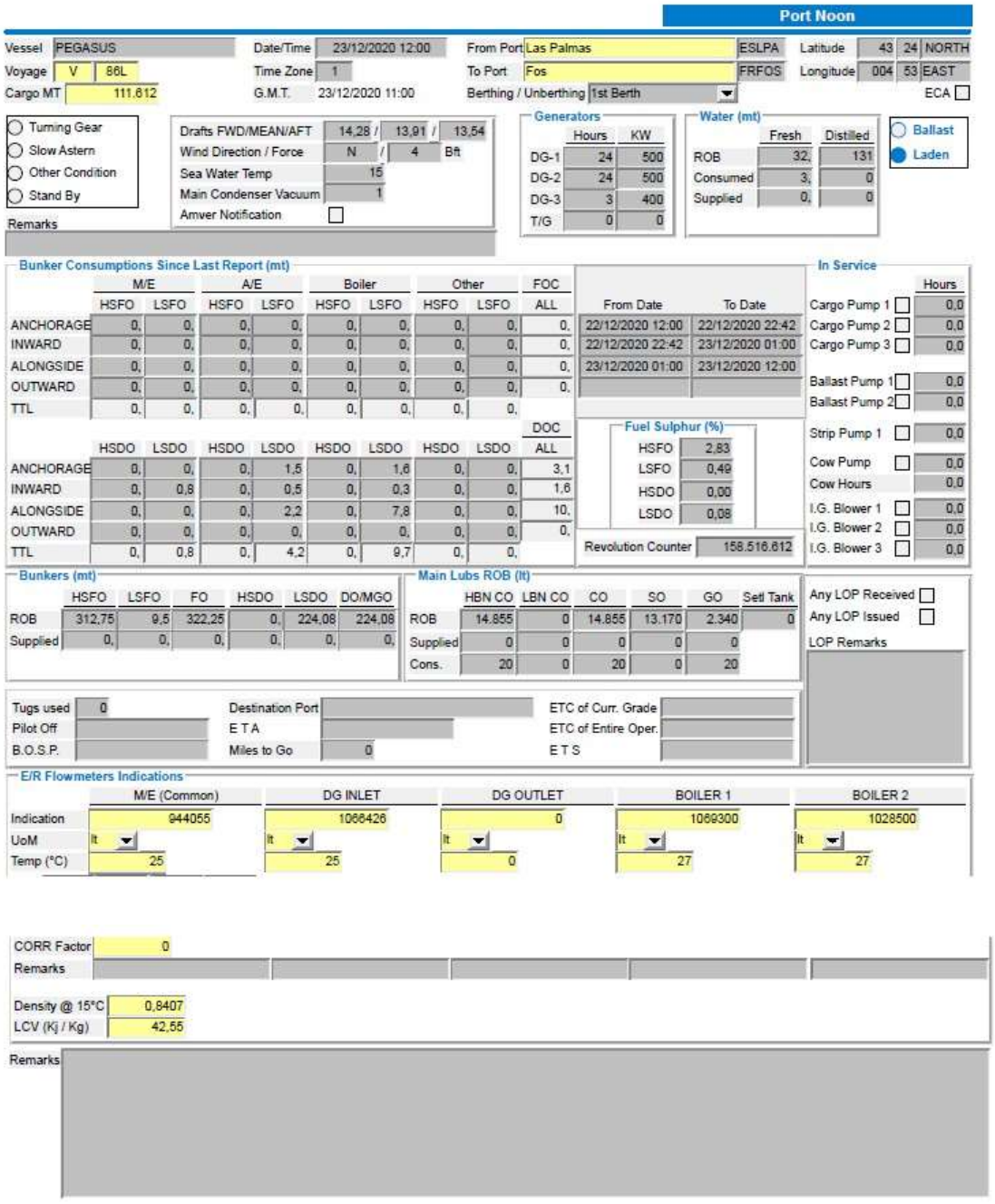
Tugs used	0	Destination Port		ETC of Curr. Grade	
Pilot Off		E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	943959	1065923	0	1059000	1027100
UoM	lt	lt	lt	lt	lt
Temp (°C)	24	25	0	28	28

CORR Factor	0
Remarks	
Density @ 15°C	0,8407
LCV (Kj / Kg)	4265

Remarks



Port Noon

Vessel	PEGASUS	Date/Time	23/12/2020 12:00	From Port	Las Palmas	ESLPA	Latitude	43	24 NORTH
Voyage	V 86L	Time Zone	1	To Port	Fos	FRFOS	Longitude	004	53 EAST
Cargo MT	111.612	G.M.T.	23/12/2020 11:00	Berthing / Unberthing	1st Berth				ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Remarks

Drafts FWD/MEAN/AFT	14,28 /	13,91 /	13,54
Wind Direction / Force	N /	4	Bft
Sea Water Temp	15		
Main Condenser Vacuum	1		
Amver Notification	☐		

Generators

	Hours	KW
DG-1	24	500
DG-2	24	500
DG-3	3	400
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	32,	131
Consumed	3,	0
Supplied	0,	0

○ Ballast ● Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	0,	0,	0,	0,	0,	

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,	0,	1,5	0,	1,6	0,	0,	3,1
INWARD	0,	0,8	0,	0,5	0,	0,3	0,	0,	1,6
ALONGSIDE	0,	0,	0,	2,2	0,	7,8	0,	0,	10,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,8	0,	4,2	0,	9,7	0,	0,	

From Date	To Date
22/12/2020 12:00	22/12/2020 22:42
22/12/2020 22:42	23/12/2020 01:00
23/12/2020 01:00	23/12/2020 12:00

Fuel Sulphur (%)

HSFO	2,83
LSFO	0,49
HSDO	0,00
LSDO	0,08

Revolution Counter 158.516.612

In Service

	Hours
Cargo Pump 1 ☐	0,0
Cargo Pump 2 ☐	0,0
Cargo Pump 3 ☐	0,0
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	312,75	9,5	322,25	0,	224,08	224,08
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	14.855	0	14.855	13.170	2.340	0
Supplied	0	0	0	0	0	
Cons.	20	0	20	0	20	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

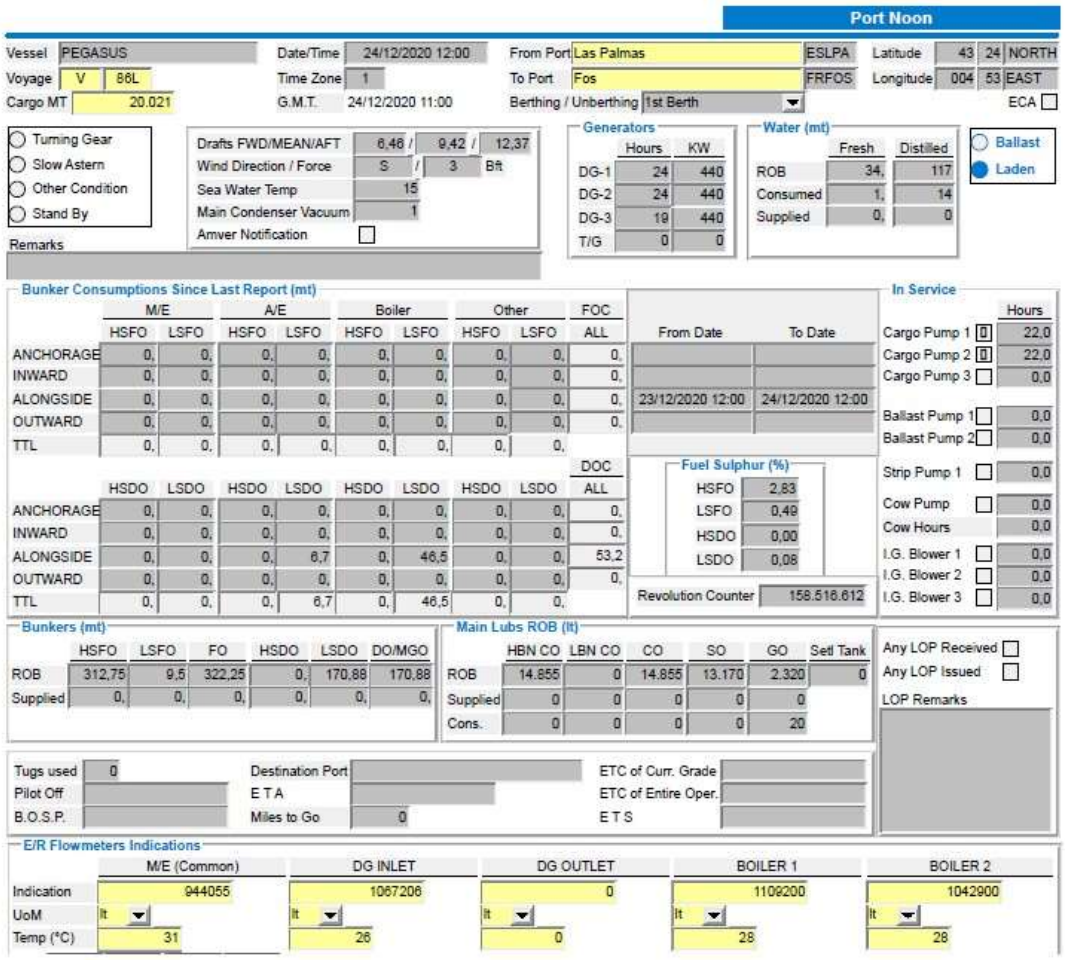
Tugs used	0	Destination Port		ETC of Curr. Grade	
Pilot Off		E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	944055	1066426	0	1069300	1028500
UoM	lt	lt	lt	lt	lt
Temp (°C)	25	25	0	27	27

CORR Factor	0
Remarks	
Density @ 15°C	0,8407
LCV (Kj / Kg)	42,55

Remarks



Port Noon

Vessel	PEGASUS	Date/Time	24/12/2020 12:00	From Port	Las Palmas	ESLPA	Latitude	43 24	NORTH
Voyage	V 86L	Time Zone	1	To Port	Fos	FRFOS	Longitude	004 53	EAST
Cargo MT	20.021	G.M.T.	24/12/2020 11:00	Berthing / Unberthing	1st Berth				ECA ☐

○ Turning Gear ○ Slow Astern ○ Other Condition ○ Stand By

Remarks

Drafts FWD/MEAN/AFT	6,46 /	9,42 /	12,37
Wind Direction / Force	S /	3	Bft
Sea Water Temp	15		
Main Condenser Vacuum	1		
Amver Notification	☐		

Generators

	Hours	KW
DG-1	24	440
DG-2	24	440
DG-3	19	440
T/G	0	0

Water (mt)

	Fresh	Distilled
ROB	34,	117
Consumed	1,	14
Supplied	0,	0

○ Ballast ● Laden

Bunker Consumptions Since Last Report (mt)

	M/E		A/E		Boiler		Other		FOC
	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	HSFO	LSFO	ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,	0,	0,	0,	0,	0,	0,
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	0,	0,	0,	0,	0,	

	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	HSDO	LSDO	DOC ALL
ANCHORAGE	0,	0,	0,	0,	0,	0,	0,	0,	0,
INWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
ALONGSIDE	0,	0,	0,	6,7	0,	46,5	0,	0,	53,2
OUTWARD	0,	0,	0,	0,	0,	0,	0,	0,	0,
TTL	0,	0,	0,	6,7	0,	46,5	0,	0,	

From Date	To Date
23/12/2020 12:00	24/12/2020 12:00

Fuel Sulphur (%)

HSFO	2,83
LSFO	0,49
HSDO	0,00
LSDO	0,08

Revolution Counter 158.516.612

In Service

	Hours
Cargo Pump 1 ☐	22,0
Cargo Pump 2 ☐	22,0
Cargo Pump 3 ☐	0,0
Ballast Pump 1 ☐	0,0
Ballast Pump 2 ☐	0,0
Strip Pump 1 ☐	0,0
Cow Pump ☐	0,0
Cow Hours	0,0
I.G. Blower 1 ☐	0,0
I.G. Blower 2 ☐	0,0
I.G. Blower 3 ☐	0,0

Bunkers (mt)

	HSFO	LSFO	FO	HSDO	LSDO	DO/MGO
ROB	312,75	9,5	322,25	0,	170,88	170,88
Supplied	0,	0,	0,	0,	0,	0,

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO	Setl Tank
ROB	14.855	0	14.855	13.170	2.320	0
Supplied	0	0	0	0	0	
Cons.	0	0	0	0	20	

Any LOP Received ☐
Any LOP Issued ☐
LOP Remarks

Tugs used	0	Destination Port		ETC of Curr. Grade	
Pilot Off		E T A		ETC of Entire Oper.	
B.O.S.P.		Miles to Go	0	E T S	

E/R Flowmeters Indications

	M/E (Common)	DG INLET	DG OUTLET	BOILER 1	BOILER 2
Indication	944055	1067206	0	1109200	1042900
UoM	lt	lt	lt	lt	lt
Temp (°C)	31	26	0	28	28

CORR Factor	0
Remarks	
Density @ 15°C	0,8656
LCV (Kj / Kg)	42,55

Remarks

4.2.3 M/V ALPHA BRAVERY NOON REPORT

M/V ALPHA BRAVERY is a bulk carrier built on 2011 with 93715 GRT carrying a Greek flag. M/V ALPHA BRAVERY is a capsize ship meaning that are too large to transit Suez or Panama Canal so they have to pass either Cape Agulhas or Horn to transverse between oceans. Capesize bulk carriers have more than 156000 DWT and they usually carry coal, ore and other commodity raw materials. They can berth only at big and deep ports due to their big size and depth.

Vessel's in-port reports examined are the following:

1) Port Boreyong, S. Korea where vessels stayed from 13 – 19/04/2021 for discharging operations.
2) Port Qinqdao, China where vessel stayed from 18 -20 /07/2021 for cargo operations.

M/V ALPHA BRAVERY in Atlantic Ocean

4.2.3.1 PORT: BOREYONG, SOUTH KOREA

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 07/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☑ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T.: 07/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,7,
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,7

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	18	230
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	417,45	417,45
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,7	2,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	15400	0	16200	12100	5200
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	101:30	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Created on : 07/04/2021 09:40
Modified by : masterabr | Modified on : 07/04/2021 14:40

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 08/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 08/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,45
Boiler	0,	0,	0,	0,	0,	1,50
Total	0,	0,	0,	0,	0,	3,959

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	16	220
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	412,50	412,50
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	3,95	3,95

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	15340	0	16140	12015	4300
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt
Ttl Anchor Time: 101:30 | E T B
Miles to Go: 0 | E T D

Remarks

Telegram created onboard ? ☒
Created by : bridgeabr | Modified by : masterabr
Created on : 08/04/2021 10:50 | Modified on : 08/04/2021 13:30

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 09/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 09/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,27
Boiler	0,	0,	0,	0,	0,	
Total	0,	0,	0,	0,	0,	2,27

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	16	220
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	410,23	415,18
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,7	2,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	15300	0	16120	12010	5150
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt:
Ttl Anchor Time: 101:30 | ETB:
Miles to Go: 0 | ETD:

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Modified by : masterabr
Created on : 09/04/2021 10:05 | Modified on : 09/04/2021 15:07

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 10/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☑ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 10/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,4
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,4

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	16	220
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	407.83	407.83
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,7	2,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	15140	0	16040	11900	5100
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

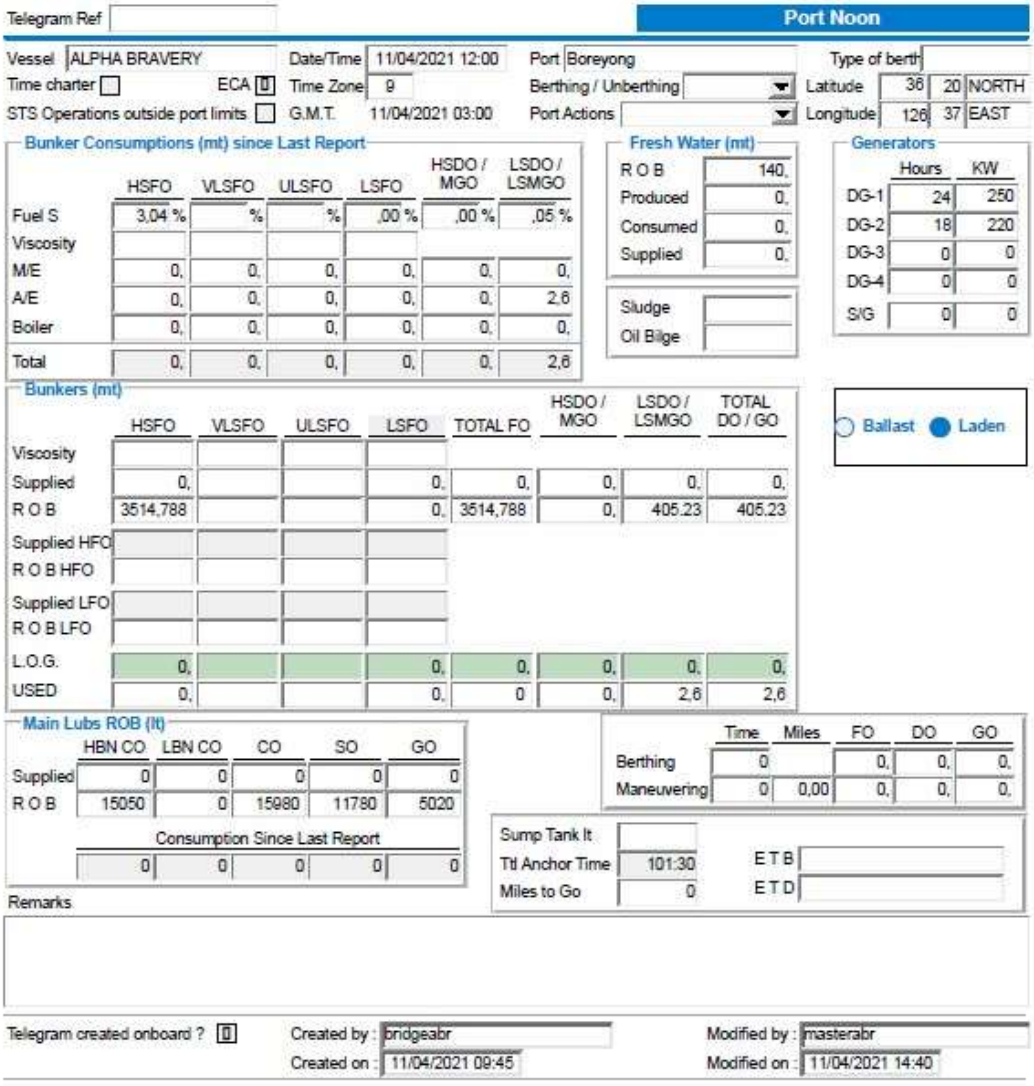
Sump Tank lt	
Ttl Anchor Time	101:30
Miles to Go	0

ETB
ETD

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Modified by : masterabr
Created on : 10/04/2021 11:15 | Modified on : 10/04/2021 14:20



Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 11/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☑ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 11/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,6
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,6

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	18	220
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	405.23	405.23
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,6	2,6

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	15050	0	15980	11780	5020
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

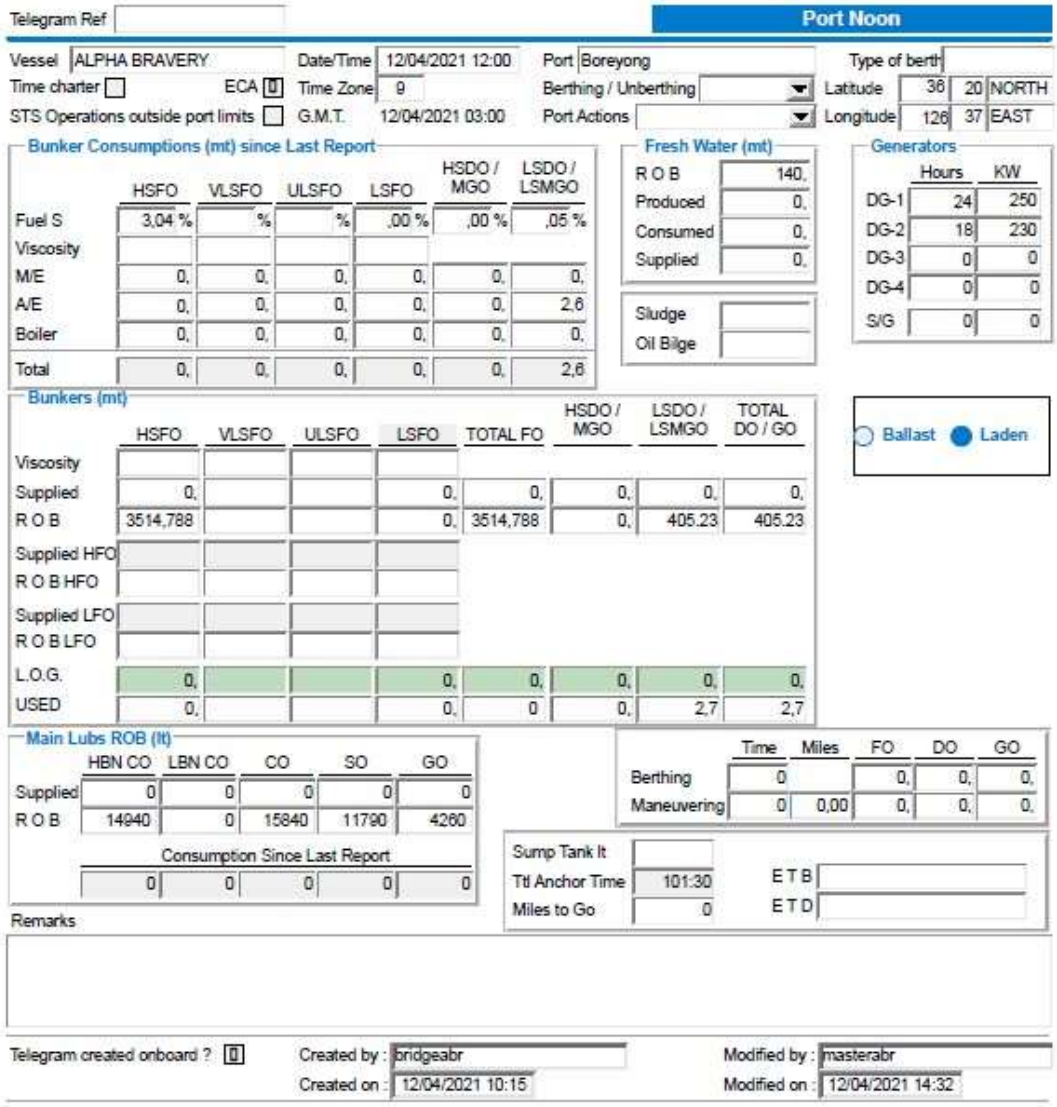
Sump Tank lt	
Ttl Anchor Time	101:30
Miles to Go	0

ETB
ETD

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Modified by : masterabr
Created on : 11/04/2021 09:45 | Modified on : 11/04/2021 14:40



Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 12/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 12/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,6
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,6

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	18	230
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	405.23	405.23
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,7	2,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	14940	0	15840	11790	4260
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	101:30
Miles to Go	0

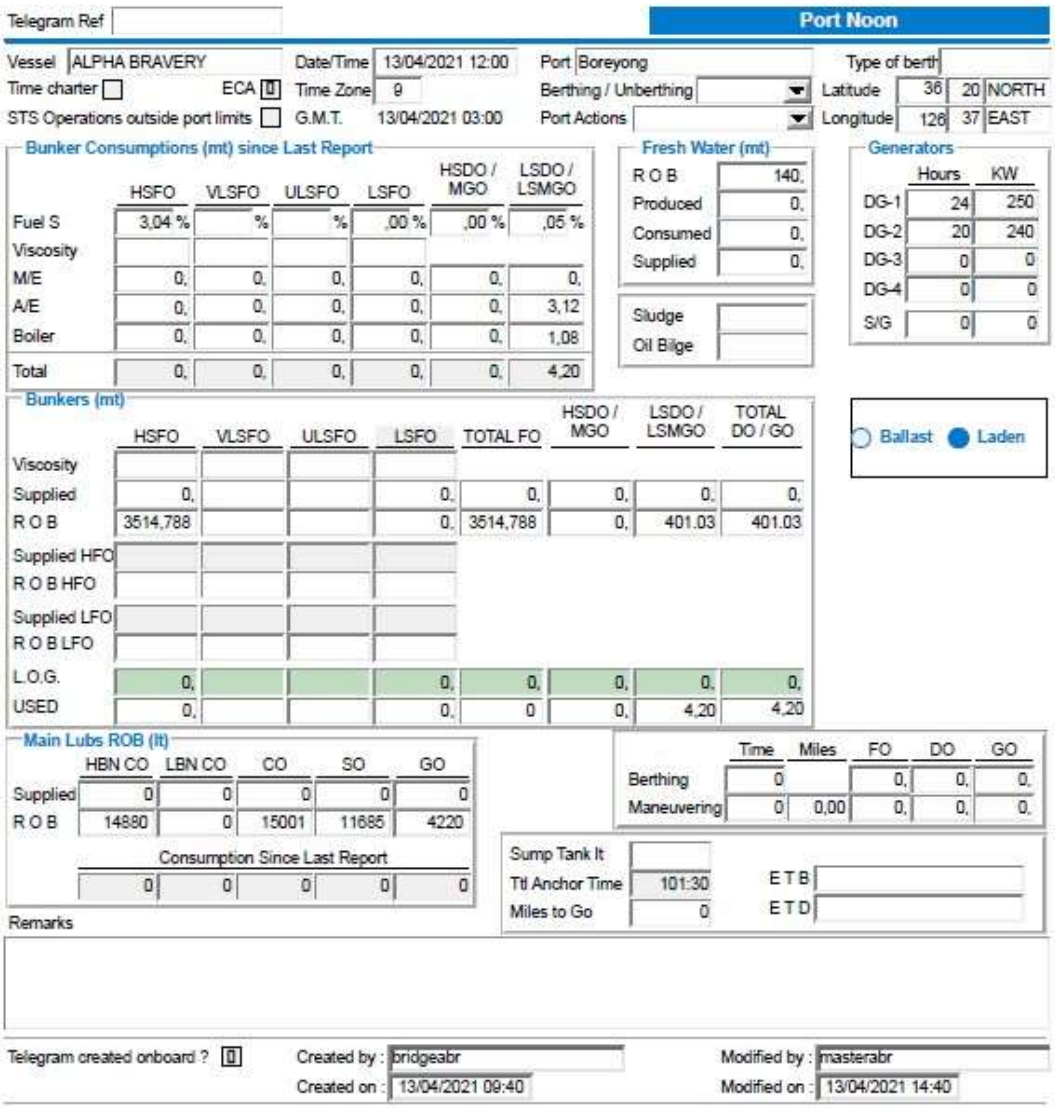
ETB:
ETD:

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Created on : 12/04/2021 10:15

Modified by : masterabr | Modified on : 12/04/2021 14:32



Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 13/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☒ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T.: 13/04/2021 03:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	3,12
Boiler	0,	0,	0,	0,	0,	1,08
Total	0,	0,	0,	0,	0,	4,20

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	250
DG-2	20	240
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	401.03	401.03
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	4,20	4,20

○ Ballast ● Laden

Main Lubs ROB (lt)

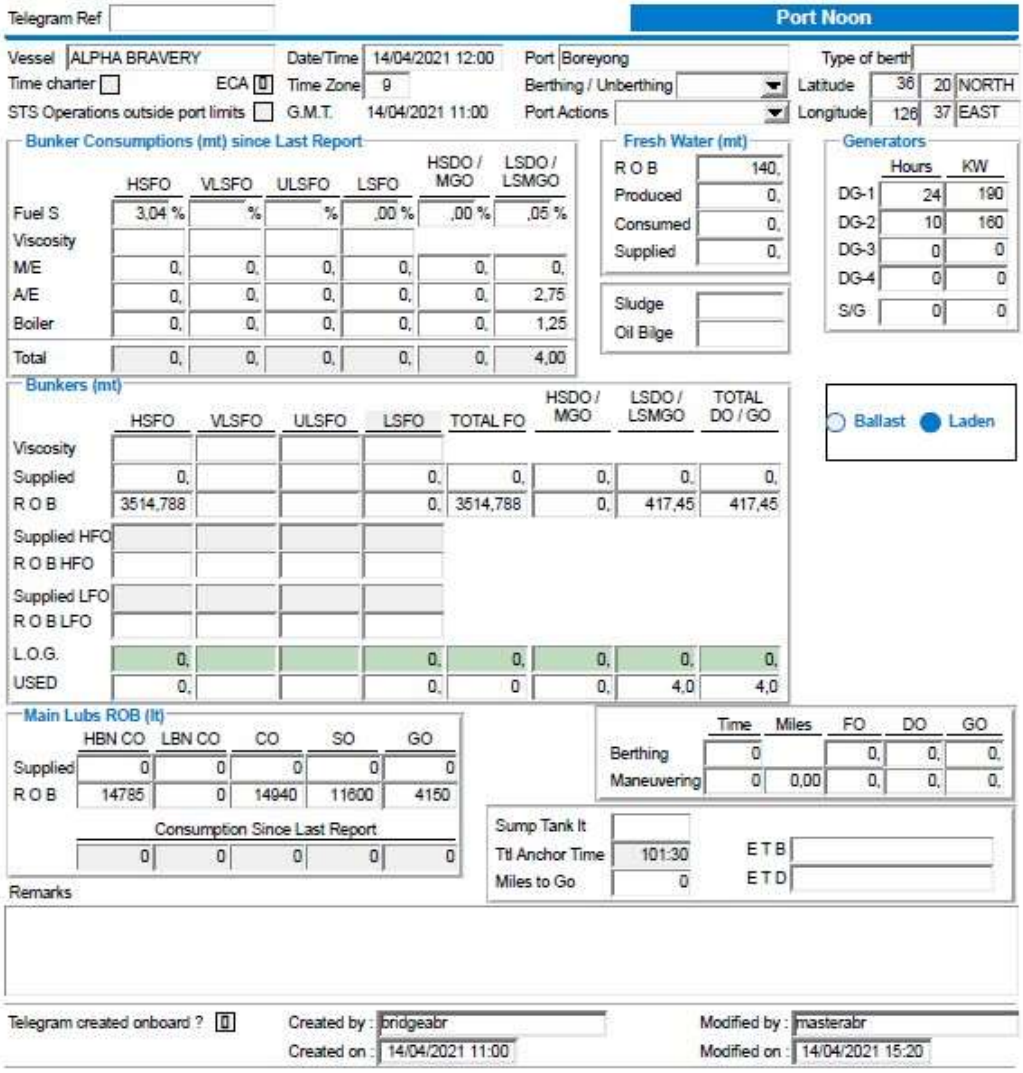
	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	14880	0	15001	11685	4220
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt:
Ttl Anchor Time: 101:30 | ETB:
Miles to Go: 0 | ETD:

Remarks

Telegram created onboard ? ☒
Created by : bridgeabr | Modified by : masterabr
Created on : 13/04/2021 09:40 | Modified on : 13/04/2021 14:40



Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 14/04/2021 12:00 | Port: Boreyong | Type of berth:
Time charter ☐ | ECA ☐ | Time Zone: 9 | Berthing / Unberthing: | Latitude: 36 20 NORTH
STS Operations outside port limits ☐ | G.M.T. 14/04/2021 11:00 | Port Actions: | Longitude: 126 37 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,04 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,75
Boiler	0,	0,	0,	0,	0,	1,25
Total	0,	0,	0,	0,	0,	4,00

Fresh Water (mt)

R O B	140,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	190
DG-2	10	160
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	3514,788			0,	3514,788	0,	417,45	417,45
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	4,0	4,0

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	14785	0	14940	11600	4150
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt:
Ttl Anchor Time: 101:30 | ETB:
Miles to Go: 0 | ETD:

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Modified by : masterabr
Created on : 14/04/2021 11:00 | Modified on : 14/04/2021 15:20

4.2.3.2 PORT: QINQDAO, CHINA

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 18/07/2021 12:00 | Port: Qinqdao | Type of berth:
Time charter ☐ | ECA ☐ | Time Zone: 8 | Berthing / | Latitude: 36 06 NORTH
STS Operations outside port limits ☐ | G.M.T.: 18/07/2021 04:00 | Unberthing Port | Longitude: 120 22 EAST

Bunker Consumptions (mt) since Last Report — Actions

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,25 %	%	%	,00 %	,00 %	,04 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,1
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,1

Fresh Water (mt)

R O B	115,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	18	200
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2845,584			0,	2845,584	0,	450,80	450,80
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,1	2,1

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12400	11850	14540	12054	6500
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

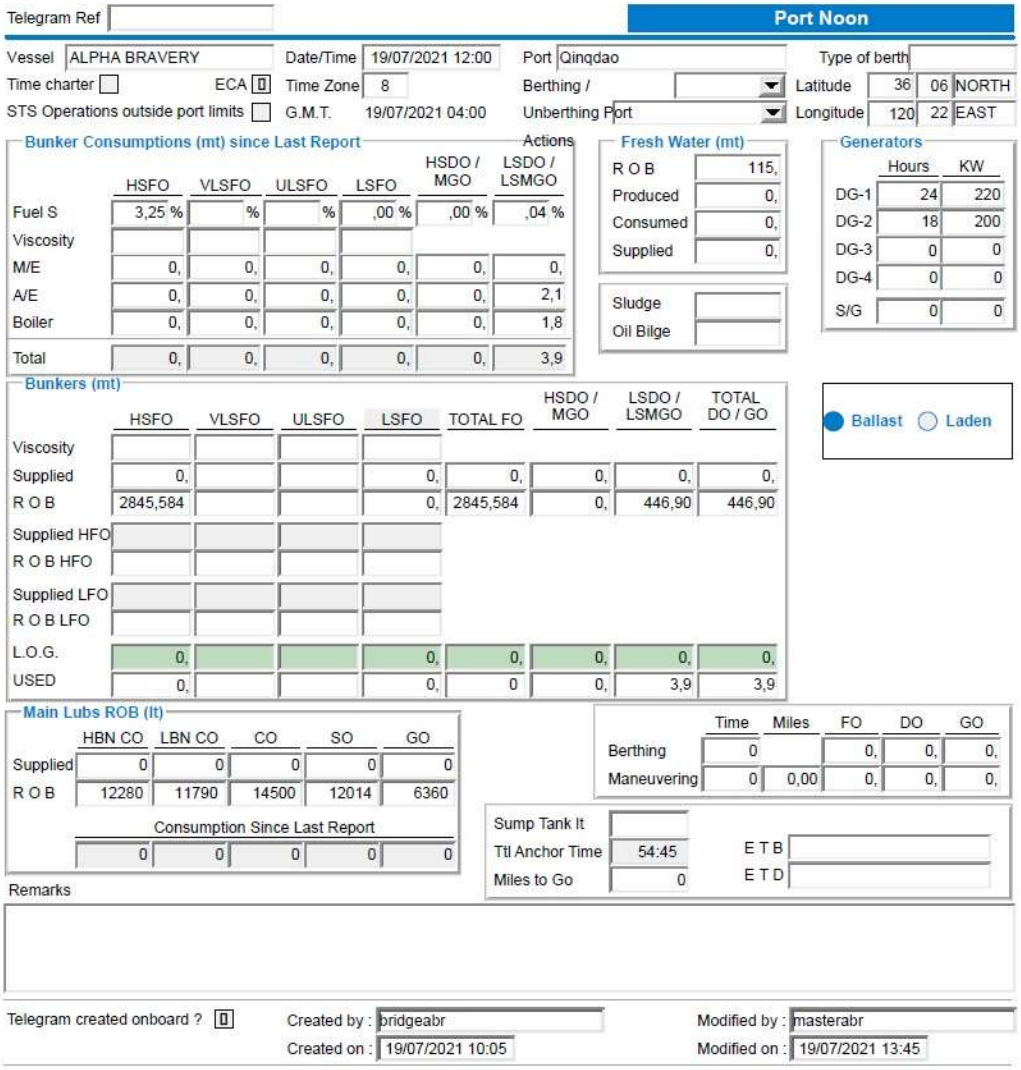
Sump Tank lt	
Ttl Anchor Time	54:45
Miles to Go	0

E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeabr | Modified by : masterabr
Created on : 18/07/2021 09:25 | Modified on : 18/07/2021 14:30



Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 19/07/2021 12:00 | Port: Qinqdao | Type of berth:
Time charter: ☐ | ECA: ☒ | Time Zone: 8 | Berthing / | Latitude: 36 06 NORTH
STS Operations outside port limits: ☐ | G.M.T. 19/07/2021 04:00 | Unberthing Port | Longitude: 120 22 EAST

Bunker Consumptions (mt) since Last Report

Actions

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,25 %	%	%	,00 %	,00 %	,04 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,1
Boiler	0,	0,	0,	0,	0,	1,8
Total	0,	0,	0,	0,	0,	3,9

Fresh Water (mt)

R O B	115,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	18	200
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2845,584			0,	2845,584	0,	446,90	446,90
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	3,9	3,9

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12280	11790	14500	12014	6360
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt
Ttl Anchor Time 54:45
Miles to Go 0
E T B
E T D

Remarks

Telegram created onboard ? ☒
Created by : bridgeabr | Created on : 19/07/2021 10:05
Modified by : masterabr | Modified on : 19/07/2021 13:45

Telegram Ref

Port Noon

Vessel: ALPHA BRAVERY | Date/Time: 20/07/2021 12:00 | Port: Qingdao | Type of berth:
Time charter: ☐ | ECA: ☒ | Time Zone: 8 | Berthing / | Latitude: 36 06 NORTH
STS Operations outside port limits: ☐ | G.M.T. 19/07/2021 04:00 | Unberthing Port | Longitude: 120 22 EAST

Bunker Consumptions (mt) since Last Report — Actions

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,25 %	%	%	,00 %	,00 %	,04 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,4
Boiler	0,	0,	0,	0,	0,	1,1
Total	0,	0,	0,	0,	0,	3,5

Fresh Water (mt)

R O B	115,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	240
DG-2	18	200
DG-3	0	0
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2845,584			0,	2845,584	0,	443,40	443,40
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,1	2,1

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	12200	11715	14435	11965	6286
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	54:45	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☒

Created by : bridgeabr | Modified by : masterabr
Created on : 20/07/2021 09:40 | Modified on : 20/07/2021 14:00

4.2.4 M/V ALPHA CHARM NOON REPORT

M/V ALPHA CHARM is a Bulk Carrier that was built in 2014 and is sailing under the flag of Greece. Her carrying capacity is 82052 t DWT and belongs in Post-Panamax Bulkers. Post-Panamax or Over-Panamax denote ships larger than Panamax (60000-80000 t) that do not fit in the original Panama Canal locks. After new Panama Canal, these vessels can transit it and avoid the round of Cape Horn. Post-Panamax vessels have a carrying capacity of 80,000 – 109,999 dwt and tend to have a shallower draft and larger beam than standard Panamax vessels. They are designed for loading high cubic cargoes from draught restricted ports.

M/V ALPHA CHARM reports examined concerned the following berthing:

1) Port Shanghai, China where vessel stayed from 24 February to 2 March of 2021
2) Port Kalama, USA where vessel stayed from 12 to 15 October of 2020.

M/V ALPHA CHARM during her approach at Indonesian Port.

4.2.4.1 PORT: SHANGHAI, CHINA

Telegram Ref

Port Noon

Vessel	ALPHA CHARM	Date/Time	24/02/2021 12:00	Port	Shanghai	Type of berth			
Time charter ☐	ECA 14	Time Zone	8	Berthing /		Latitude	31	22	NORTH
STS Operations outside port limits ☐		G.M.T.	24/02/2021 04:00	Unberthing Port		Longitude	121	36	EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Actions						
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,8
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,8

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	0	0
DG-3	18	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	240,22	240,22
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,8	1,8

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	9400	0	8200	6100	3400
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	25:10	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgeach
Created on : 24/02/2021 09:40

Modified by : masterach
Modified on : 24/02/2021 14:40

Telegram Ref

Port Noon

Vessel ALPHA CHARM | Date/Time 25/02/2021 12:00 | Port Shanghai | Type of berth

Time charter ☐ | ECA 14 | Time Zone 8 | Berthing / | Latitude 31 22 NORTH

STS Operations outside port limits ☐ | G.M.T. 25/02/2021 04:00 | Unberthing Port | Longitude 121 36 EAST

Bunker Consumptions (mt) since Last Report

Actions

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,9
Boiler	0,	0,	0,	0,	0,	1,2
Total	0,	0,	0,	0,	0,	3,1

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	0	0
DG-3	18	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	237,12	237,12
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	3,1	3,1

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	9250	0	8100	6020	3300
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	25:10
Miles to Go	0

E T B

E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Created on : 25/02/2021 10:00

Modified by : masterach | Modified on : 25/02/2021 13:55

Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 26/02/2021 12:00 | Port: Shanghai | Type of berth:
Time charter: ☐ | ECA: 14 | Time Zone: 8 | Berthing / | Latitude: 31 22 NORTH
STS Operations outside port limits: ☐ | G.M.T.: 26/02/2021 04:00 | Unberthing Port | Longitude: 121 36 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,7
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,7

Actions

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	190
DG-2	0	0
DG-3	16	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	235,42	235,42
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,7	1,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	9180	0	8025	5945	3210
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

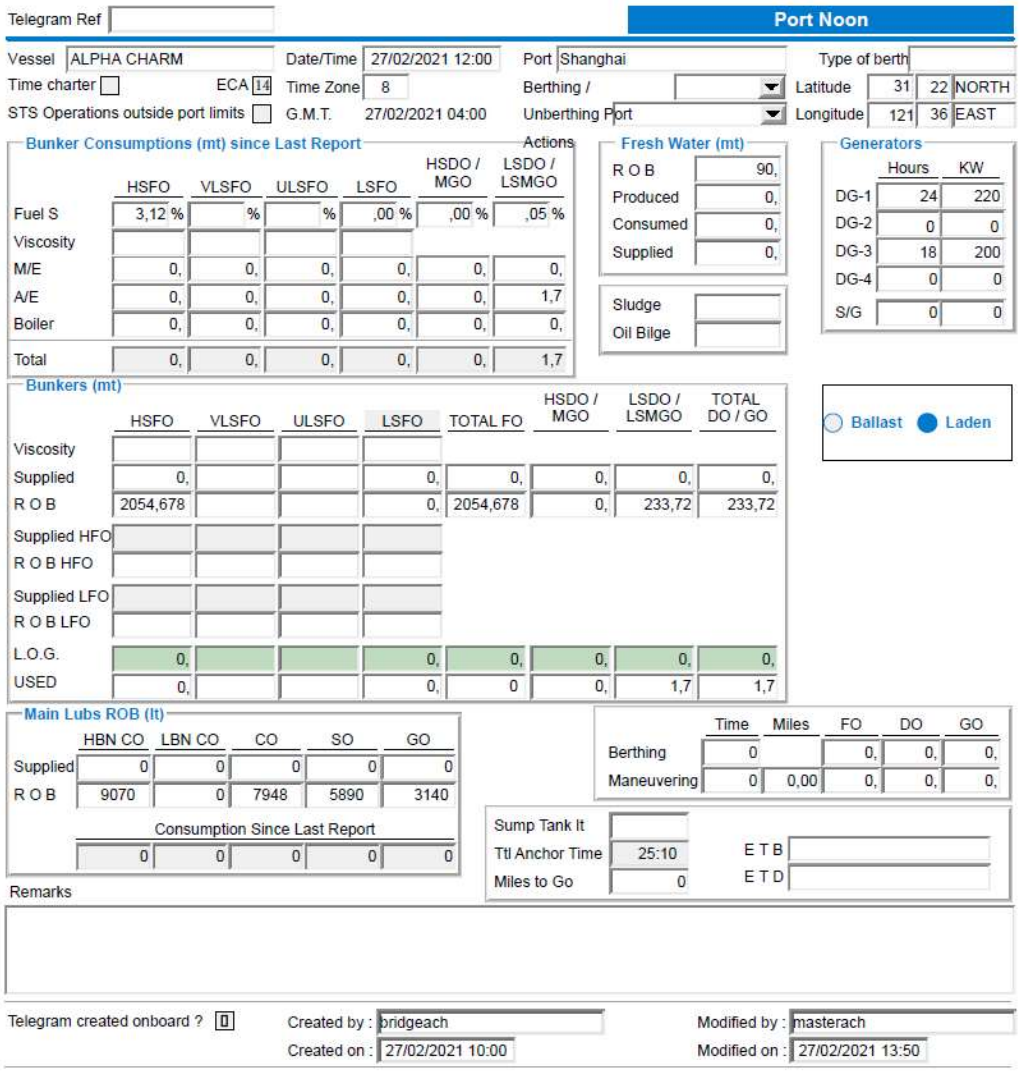
Sump Tank lt	
Ttl Anchor Time	25:10
Miles to Go	0

E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Modified by : masterach
Created on : 26/02/2021 09:55 | Modified on : 26/02/2021 13:10



Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 27/02/2021 12:00 | Port: Shanghai | Type of berth:
Time charter ☐ | ECA 14 | Time Zone: 8 | Berthing / | Latitude: 31 22 NORTH
STS Operations outside port limits ☐ | G.M.T. 27/02/2021 04:00 | Unberthing Port | Longitude: 121 36 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,7
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,7

Actions

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	0	0
DG-3	18	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	233,72	233,72
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,7	1,7

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	9070	0	7948	5890	3140
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

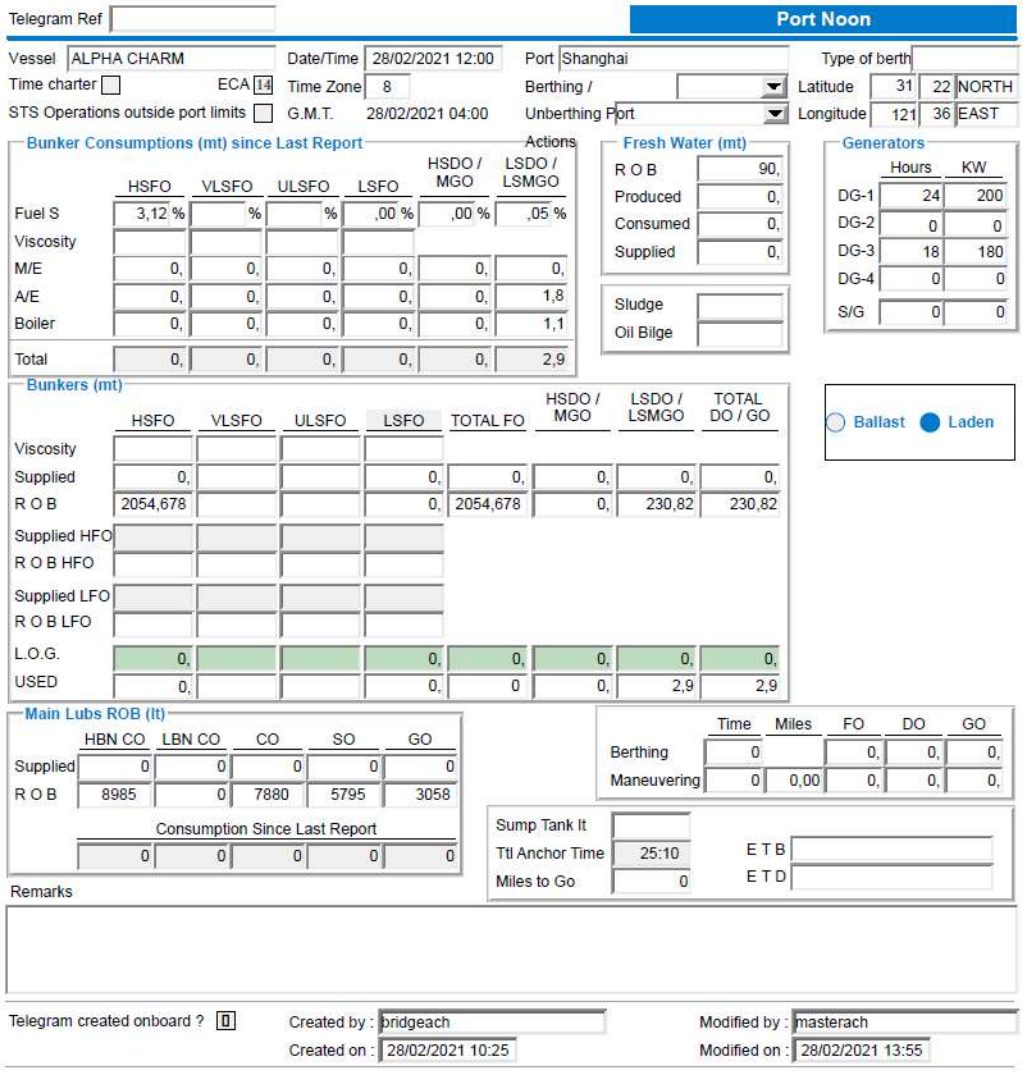
Sump Tank lt
Ttl Anchor Time: 25:10
Miles to Go: 0
E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach
Created on : 27/02/2021 10:00

Modified by : masterach
Modified on : 27/02/2021 13:50



Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 28/02/2021 12:00 | Port: Shanghai | Type of berth:
Time charter ☐ | ECA 14 | Time Zone: 8 | Berthing / | Latitude: 31 22 NORTH
STS Operations outside port limits ☐ | G.M.T. 28/02/2021 04:00 | Unberthing Port | Longitude: 121 36 EAST

Bunker Consumptions (mt) since Last Report — Actions

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,8
Boiler	0,	0,	0,	0,	0,	1,1
Total	0,	0,	0,	0,	0,	2,9

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	200
DG-2	0	0
DG-3	18	180
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	230,82	230,82
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,9	2,9

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	8985	0	7880	5795	3058
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt
Ttl Anchor Time 25:10
Miles to Go 0
E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach
Created on : 28/02/2021 10:25

Modified by : masterach
Modified on : 28/02/2021 13:55

Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 01/03/2021 12:00 | Port: Shanghai | Type of berth:
Time charter ☐ | ECA 14 | Time Zone: 8 | Berthing / | Latitude: 31 22 NORTH
STS Operations outside port limits ☐ | G.M.T. 01/03/2021 04:00 | Unberthing Port | Longitude: 121 36 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,9
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,9

Actions

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	200
DG-2	0	0
DG-3	20	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	228,92	228,92
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,9	1,9

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	8910	0	7795	5670	2980
Consumption Since Last Report	0	0	0	0	0

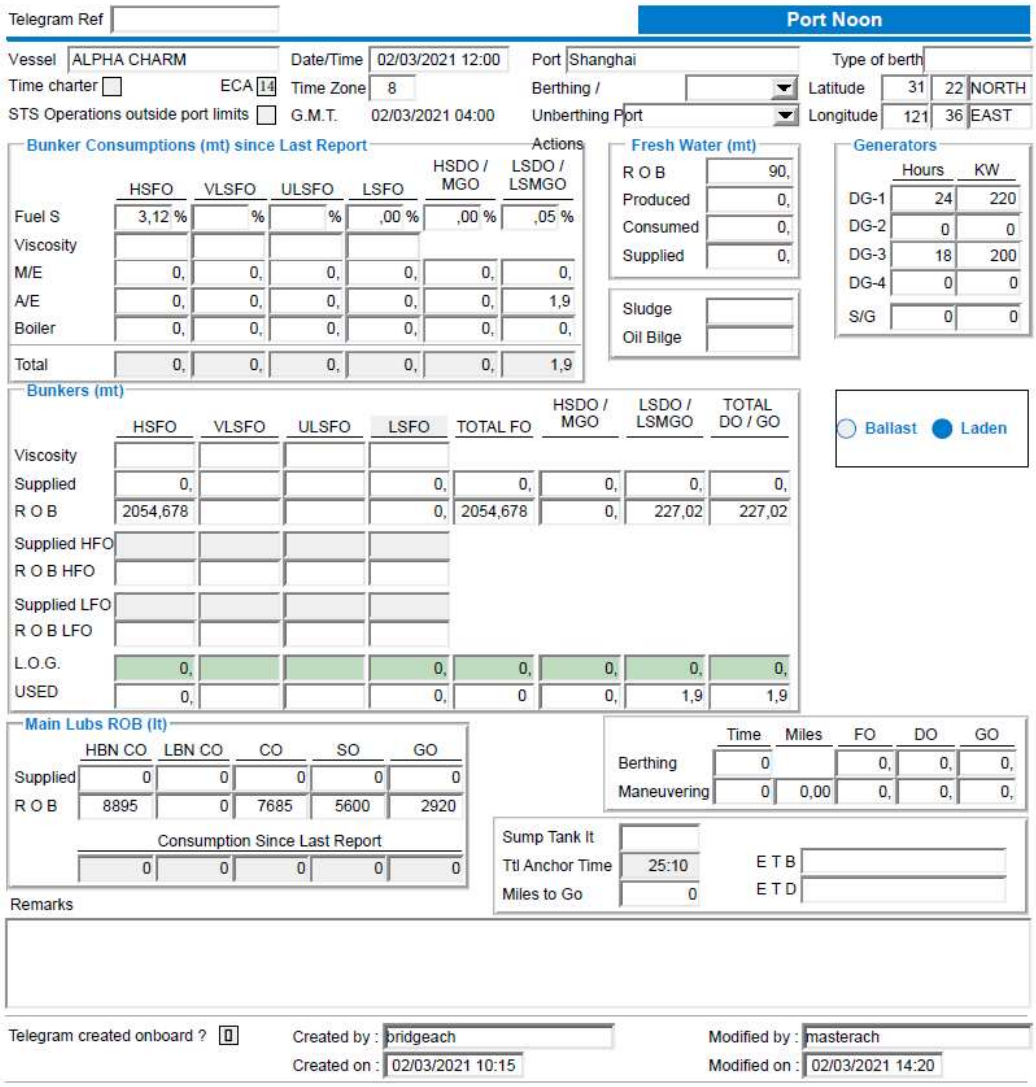
	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt			
Ttl Anchor Time	25:10	E T B	
Miles to Go	0	E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Modified by : masterach
Created on : 01/03/2021 09:55 | Modified on : 01/03/2021 13:50



Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 02/03/2021 12:00 | Port: Shanghai | Type of berth:
Time charter: ☐ | ECA: 14 | Time Zone: 8 | Berthing / | Latitude: 31 22 NORTH
STS Operations outside port limits: ☐ | G.M.T.: 02/03/2021 04:00 | Unberthing Port | Longitude: 121 36 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Actions						
Fuel S	3,12 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,9
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,9

Fresh Water (mt)

R O B	90,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	24	220
DG-2	0	0
DG-3	18	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2054,678			0,	2054,678	0,	227,02	227,02
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,9	1,9

○ Ballast ● Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	8895	0	7685	5600	2920
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	25:10
Miles to Go	0

E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach
Created on : 02/03/2021 10:15

Modified by : masterach
Modified on : 02/03/2021 14:20

4.2.4.2 PORT: TACOMA, USA

Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 12/10/2020 12:00 | Port: Tacoma | Type of berth:
Time charter ☐ | ECA 2 | Time Zone: -8 | Berthing / | Latitude: 47 25 NORTH
STS Operations outside port limits ☐ | G.M.T.: 12/10/2020 20:00 | Unberthing Port | Longitude: -122 46 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,50 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,9
Boiler	0,	0,	0,	0,	0,	1,1
Total	0,	0,	0,	0,	0,	3,0

Actions

Fresh Water (mt)

R O B	85,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	220
DG-3	18	180
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2504,895			0,	2504,895	0,	780,55	780,55
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	3,0	3,0

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	5280	7890	8500	8014	4520
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt	
Ttl Anchor Time	15:55
Miles to Go	0

E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Modified by : masterach
Created on : 12/10/2020 10:00 | Modified on : 12/10/2020 13:15

Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 13/10/2020 12:00 | Port: Tacoma | Type of berth:
Time charter ☐ | ECA 2 | Time Zone: -8 | Berthing / | Latitude: 47 25 NORTH
STS Operations outside port limits ☐ | G.M.T. 13/10/2020 20:00 | Unberthing Port | Longitude: -122 46 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Actions						
Fuel S	3,50 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,7
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	1,7

Fresh Water (mt)

R O B	85,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	200
DG-3	19	180
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2504,895			0,	2504,895	0,	778,85	778,85
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	1,7	1,7

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	5195	7755	8365	7993	4402
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

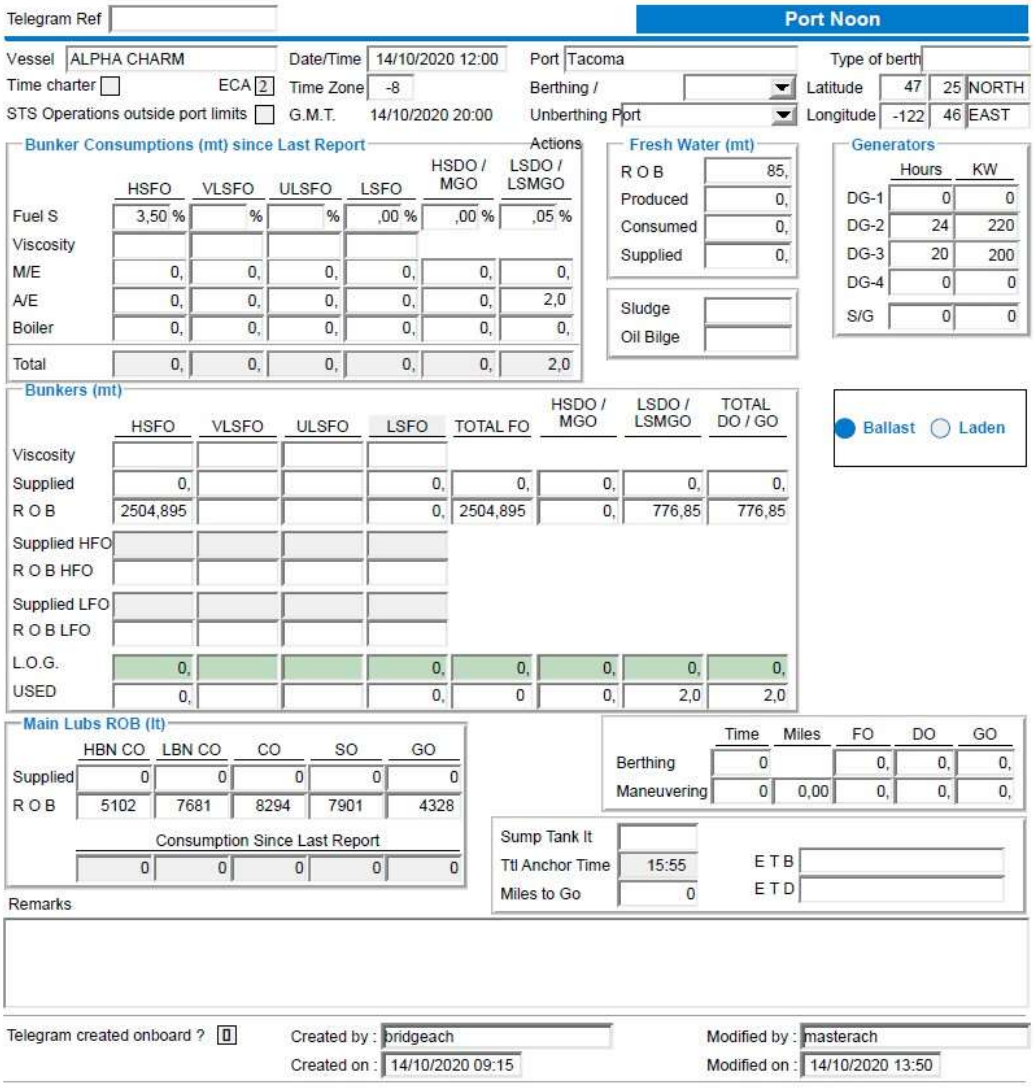
Sump Tank lt	
Ttl Anchor Time	15:55
Miles to Go	0
E T B	
E T D	

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Created on : 13/10/2020 10:40

Modified by : masterach | Modified on : 13/10/2020 14:20



Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 14/10/2020 12:00 | Port: Tacoma | Type of berth:
Time charter ☐ | ECA 2 | Time Zone: -8 | Berthing / | Latitude: 47 25 NORTH
STS Operations outside port limits ☐ | G.M.T. 14/10/2020 20:00 | Unberthing Port | Longitude: -122 46 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Fuel S	3,50 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	2,0
Boiler	0,	0,	0,	0,	0,	0,
Total	0,	0,	0,	0,	0,	2,0

Actions

Fresh Water (mt)

R O B	85,
Produced	0,
Consumed	0,
Supplied	0,

Sludge
Oil Bilge

Generators

	Hours	KW
DG-1	0	0
DG-2	24	220
DG-3	20	200
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2504,895			0,	2504,895	0,	776,85	776,85
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	2,0	2,0

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	5102	7681	8294	7901	4328
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt
Ttl Anchor Time: 15:55
Miles to Go: 0
E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach | Modified by : masterach
Created on : 14/10/2020 09:15 | Modified on : 14/10/2020 13:50

Telegram Ref

Port Noon

Vessel: ALPHA CHARM | Date/Time: 15/10/2020 12:00 | Port: Tacoma | Type of berth:
Time charter: ☐ | ECA: 2 | Time Zone: -8 | Berthing / | Latitude: 47 25 NORTH
STS Operations outside port limits: ☐ | G.M.T.: 15/10/2020 20:00 | Unberthing Port | Longitude: -122 46 EAST

Bunker Consumptions (mt) since Last Report

	HSFO	VLSFO	ULSFO	LSFO	HSDO / MGO	LSDO / LSMGO
Actions						
Fuel S	3,50 %	%	%	,00 %	,00 %	,05 %
Viscosity						
M/E	0,	0,	0,	0,	0,	0,
A/E	0,	0,	0,	0,	0,	1,9
Boiler	0,	0,	0,	0,	0,	1,2
Total	0,	0,	0,	0,	0,	3,1

Fresh Water (mt)

R O B	85,
Produced	0,
Consumed	0,
Supplied	0,

Sludge	
Oil Bilge	

Generators

	Hours	KW
DG-1	0	0
DG-2	24	210
DG-3	19	180
DG-4	0	0
S/G	0	0

Bunkers (mt)

	HSFO	VLSFO	ULSFO	LSFO	TOTAL FO	HSDO / MGO	LSDO / LSMGO	TOTAL DO / GO
Viscosity								
Supplied	0,			0,	0,	0,	0,	0,
R O B	2504,895			0,	2504,895	0,	773,75	776,85
Supplied HFO								
R O B HFO								
Supplied LFO								
R O B LFO								
L.O.G.	0,			0,	0,	0,	0,	0,
USED	0,			0,	0	0,	3,1	3,1

● Ballast ○ Laden

Main Lubs ROB (lt)

	HBN CO	LBN CO	CO	SO	GO
Supplied	0	0	0	0	0
R O B	5028	7542	8169	7815	4268
Consumption Since Last Report	0	0	0	0	0

	Time	Miles	FO	DO	GO
Berthing	0		0,	0,	0,
Maneuvering	0	0,00	0,	0,	0,

Sump Tank lt
Ttl Anchor Time: 15:55
Miles to Go: 0
E T B
E T D

Remarks

Telegram created onboard ? ☐

Created by : bridgeach
Created on : 15/10/2020 09:50

Modified by : masterach
Modified on : 15/10/2020 14:20

4.2.5 NOON REPORTS DATA OVERVIEW

In the tables below, are presented the retrieved data, from noon reports, which are useful for current thesis.

4.2.5.1 M/T CAESAR DATA OVERVIEW

	M/T CAESAR						
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT : Skaw (Denmark)	18/5/2021	5,37 (HSFO)	2	24	560		6360
			3	24	550	1110	
	19/5/2021	5,37 (HSFO)	2	3	510		
			3	24	630	1140	
	20/5/2021	5,3 (HSFO)	2	24	500		
			3	9	500	1000	
	21/5/2021	5,56 (HSFO)	2	20	500		
			3	24	500	1000	
	22/5/2021	5,77 (HSFO)	2	24	500		
			3	24	500	1000	
	23/5/2021	7,2 (HSFO)	2	24	560		
			3	24	550	1110	
		TOTAL (mt)	34,57				

	M/T CAESAR						
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT : Daesan (South Korea)	8/2/2021	5,6 (HSFO)	1	24	600		3900
			3	24	600	1200	
	9/2/2021	7,5(HSFO)	1	24	750		
			3	24	750	1500	
	10/2/2021	4,8(HSFO)	2	9,2	600		
			3	24	600	1200	
		TOTAL (mt)	17,9				

4.2.5.2 M/T PEGASUS DATA OVERVIEW

	M/T PEGASUS						
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT : Zhanjiang (China)	3/3/2021	1,3 (LSDO/LSMGO)	2	24	380		4480
			3	24	380	760	
	4/3/2021	3,6 (LSDO/LSMGO)	2	24	300		
			3	24	300	600	
	5/3/2021	3,6 (LSDO/LSMGO)	2	24	380		
			3	24	380	760	
	6/3/2021	4,3 (LSDO/LSMGO)	2	24	390		
			3	24	390	780	
	7/3/2021	4,3 (LSDO/LSMGO)	2	24	400		
			3	24	400	800	
	8/3/2021	4,0 (LSDO/LSMGO)	1	23	390		
			2	24	390	780	
		TOTAL (mt)				21,4	

	M/T PEGASUS						
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT: Fos Sur Mer (France)	22/12/2020	3,51 (LSDO)	1	19	300		3780
			2	3	300		
			3	19	300	900	
	23/12/2020	4,2 (LSDO)	1	24	500		
			2	24	500		
			3	3	400	1400	
	24/12/2020	6,7 (LSDO)	1	24	440		
			2	24	440		
			3	19	600	1480	
		TOTAL (mt)				14,41	

4.2.5.3 M/V ALPHA BRAVERY DATA OVERVIEW

M/V ALPHA BRAVERY							
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT :Boreyong (S. Korea)	7/4/2021	2,7 (LSDO)	1	24	250		3670
			3	18	230	480	
	8/4/2021	2,45 (LSDO)	1	24	250		
			3	16	220	470	
	9/4/2021	2,4 (LSDO)	1	24	250		
			3	16	220	470	
	10/4/2021	2,27 (LSDO)	1	24	250		
			3	16	220	470	
	11/4/2021	2,8 (LSDO)	1	24	250		
			3	18	220	470	
	12/4/2021	3,12 (LSDO)	1	24	250		
			3	20	240	490	
	13/4/2021	2,75 (LSDO)	1	24	250		
			3	18	220	470	
	14/4/2021	2,75 (LSDO)	5	12	190		
			7	6	160	350	
		TOTAL (mt)	18,49				

M/V ALPHA BRAVERY							
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	kW		
PORT : Qingdao (China)	18/7/2021	2,1 (LSDO)	1	24	220		1280
			2	18	200	420	
	19/7/2021	2,1 (LSDO)	1	24	220		
			2	18	200	420	
	20/7/2021	2,4 (LSDO)	1	24	240		
			2	18	200	440	
		TOTAL (mt)	8,6				

4.2.5.4 M/V ALPHA CHARM DATA OVERVIEW

M/V ALPHA CHARM							
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	KW		
PORT : Shanghai (China)	24/2/2021	1,8 (LSDO/LSMGO)	1	24	220		2770
			3	18	200	420	
	25/2/2021	1,9 (LSDO/LSMGO)	1	24	220		
			3	18	200	420	
	26/2/2021	1,7 (LSDO/LSMGO)	1	24	190		
			3	16	200	390	
	27/2/2021	1,7 (LSDO/LSMGO)	1	24	200		
			3	16	180	380	
	28/2/2021	1,8 (LSDO/LSMGO)	1	24	200		
			3	18	180	380	
	1/3/2021	1,9 (LSDO/LSMGO)	1	24	200		
			3	20	200	400	
	2/3/2021	1,9 (LSDO/LSMGO)	1	24	200		
			3	18	180	380	
		TOTAL (mt)	12,7				

M/V ALPHA CHARM							
	DATE	FUEL CONSUMPTION (mt)	GENERATORS			TOTAL PER DAY (KW)	TOTAL PER CALL (KW)
			No	Hours	KW		
PORT : Kalama (USA)	12/10/2020	1,9 (LSDO/LSMGO)	2	24	220		1590
			3	18	180	400	
	13/10/2020	1,7(LSDO/LSMGO)	2	24	200		
			3	19	180	380	
	14/10/2020	2 (LSDO/LSMGO)	2	24	220		
			3	20	200	420	
	15/10/2020	1,9 (LSDO/LSMGO)	2	24	210		
			3	19	180	390	
		TOTAL (mt)	7,5				

4.2.5.5 SUMMARY TABLE

VESSEL NAME	PORT CALL	DURATION OF STAY (DAYS)	FUEL CONSUMPTION (mt)	GENERATORS POWER LOAD (KW)
M/T CAESAR	Skaw	6	34,57	6360
	Daesan	3	17,9	3900
M/T PEGASUS	Zhanjiang	6	21,4	4480
	Fos Sur Mer	3	14,41	3780
M/V ALPHA BRAVERY	Boreyong	8	18,49	3320
	Qinqdao	4	8,6	1700
M/V ALPHA CHARM	Shanghai	7	12,7	2770
	Kalama	3	7,5	1200

4.3 MARINE TRAFFIC DATA

Marine Traffic is the world's leading provider of ship tracking and maritime intelligence. They have created the largest maritime database of data gathered from their network of coastal AIS-receiving stations, supplemented by satellite receivers, applying algorithms and integrate complementary data sources to provide the shipping, trade and logistics industries with actionable insights into shipping activity. Company's mission is to bring about transparency and meaningful change to the maritime world, underlined by partnerships with bodies such as the International Maritime Organization, and The UN Conference on Trade and Development (UNCTAD). They, also, work closely with the world's leading ports, maritime companies and oil majors, on projects dedicated to improving efficiency and reducing environmental impact.

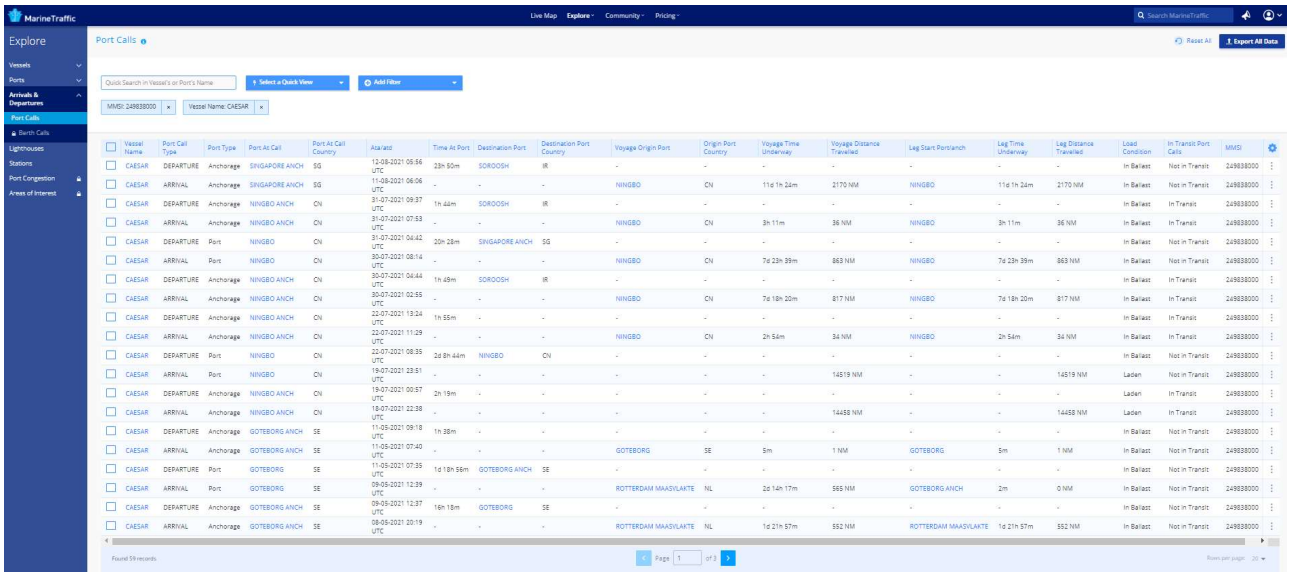
Keeping track for past voyages, duration of stay, speed, activity and other useful parameters, Marine Traffic is a powerful tool for the industry's professionals and passionate amateurs.

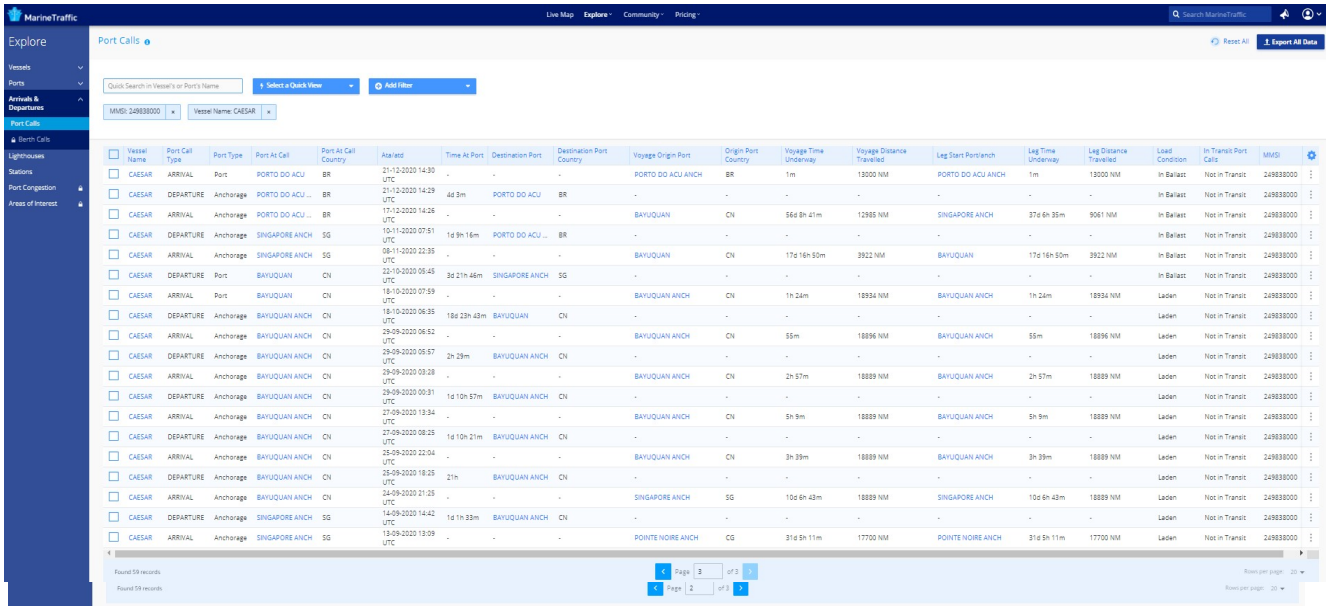
In current thesis, Marine Traffic data used in order to retrieve information regarding vessels' calls per a specific time period, so we can use them in our study.

Below, are presented the exported pages from Marine Traffic for each vessel for the available period time. Also, tables containing a summary of calls per period for each vessel

which created by Marine Traffic data. It is imperative to mention that some voyage data may miss from Marine Traffic's database due to terminals and country's copyright restrictions.

4.3.1 M/T CAESAR MARINE TRAFFIC DATA

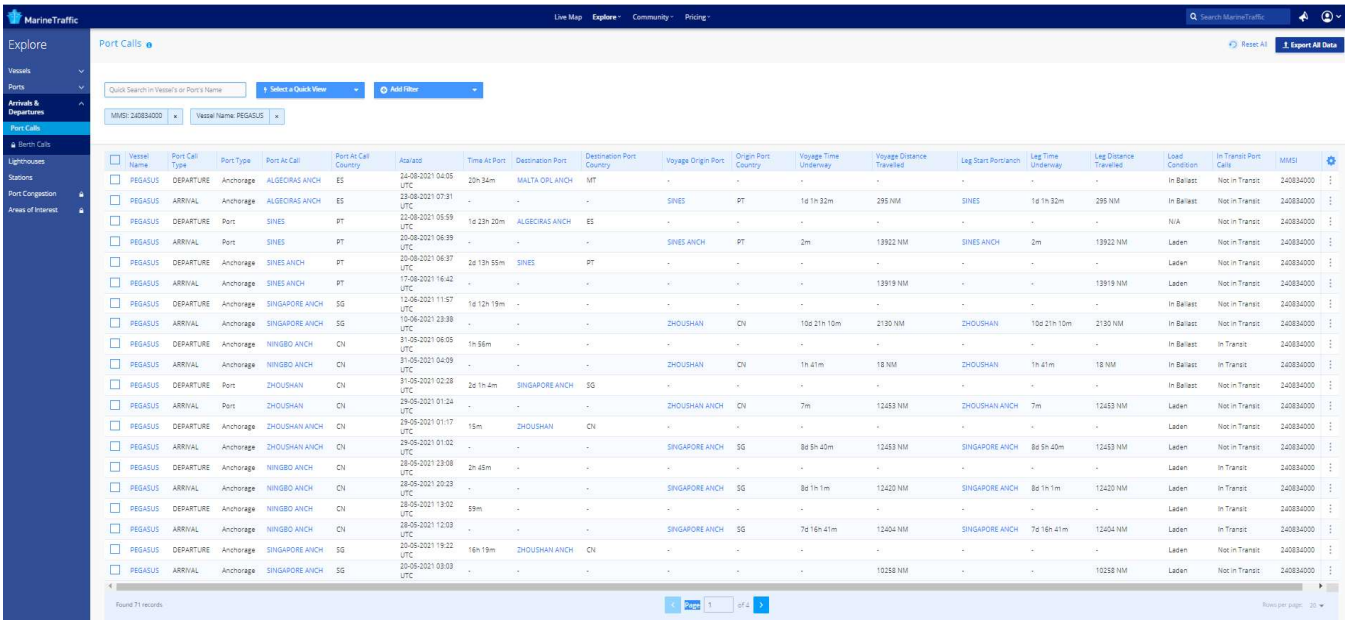


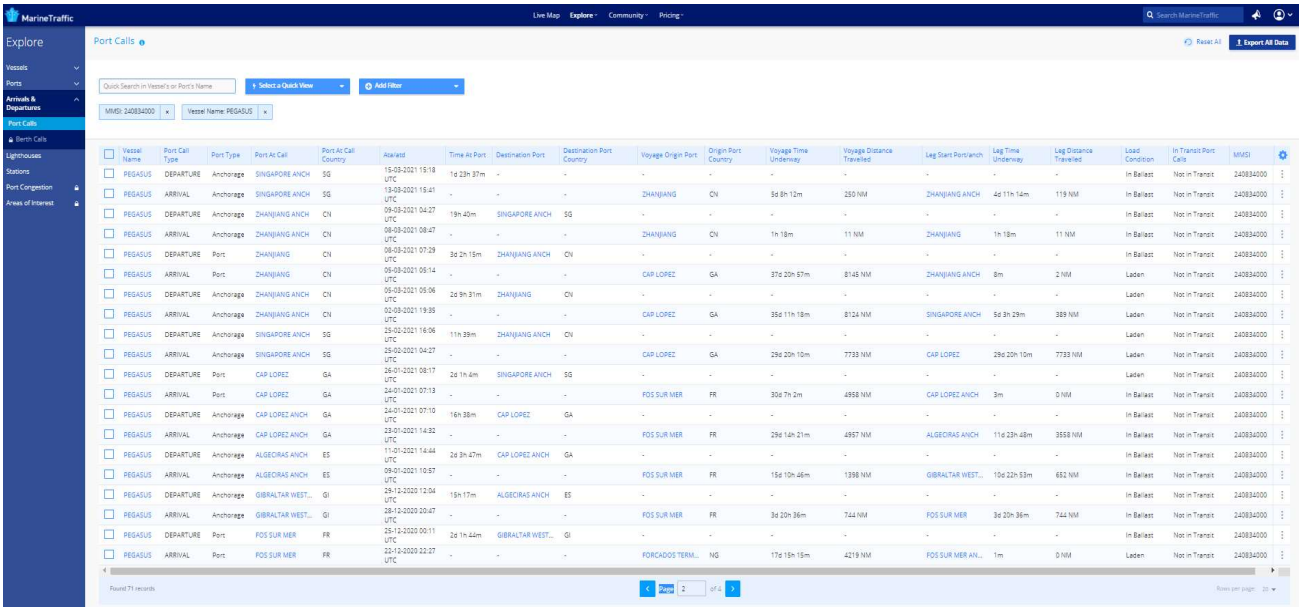


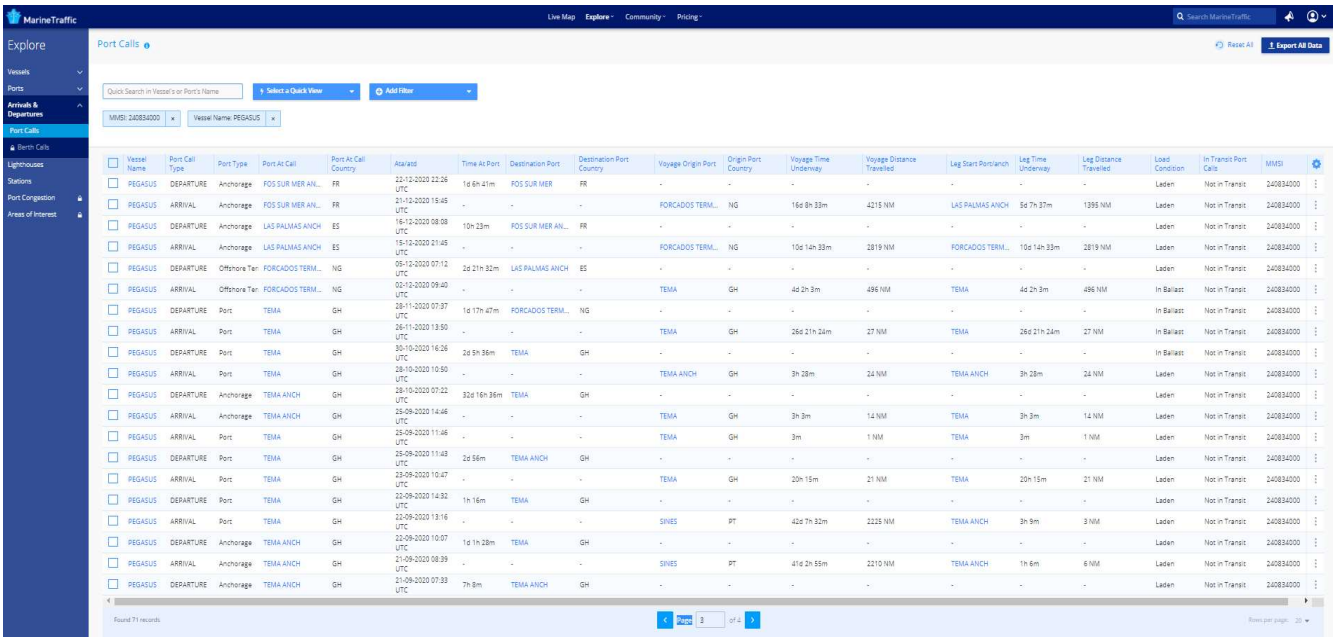
M/T CAESAR			
Port at Call	**Date of Arrival**	**Date of Departure**	**Time at Port**
Singapore	11/8/2021	12/8/2021	23h 50m
Ningbo	30/7/2021	31/7/2021	20h 28m
Ningbo	19/7/2021	22/7/2021	2d 8h 44m
Skaw	18/5/2021	23/5/2021	6d 2h 45m
Goteborg	9/5/2021	11/5/2021	1d 18h 56m
Rotterdam	5/5/2021	6/5/2021	1d 8h 2m
Qua Iboe Terminal	12/4/2021	18/4/2021	5d 19h 49m
Escravos	8/4/2021	10/4/2021	2d 6h 57m
Daesan	24/2/2021	25/2/2021	19h 45m
Daesan	8/2/2021	10/2/2021	3d 4h 35m
Porto de Acu	21/12/2020	26/12/2020	5d 5h 10m
Bayuquan	18/10/2020	22/10/2020	3d 21h 46m

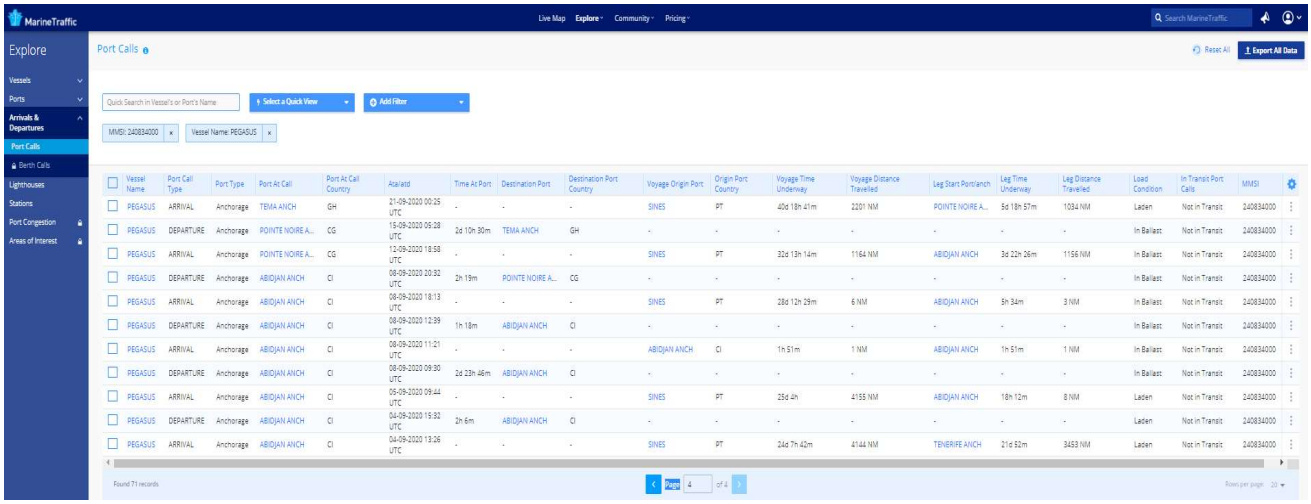
M/T Caesar have called 12 ports during the last 12 months, as per Marine traffic data. In total, vessel spent 30 days 16 hours and 21 minutes at ports while average time of stay duration was 1 day 9 hours and 40 minutes.

4.3.2 M/T PEGASUS MARINE TRAFFIC DATA





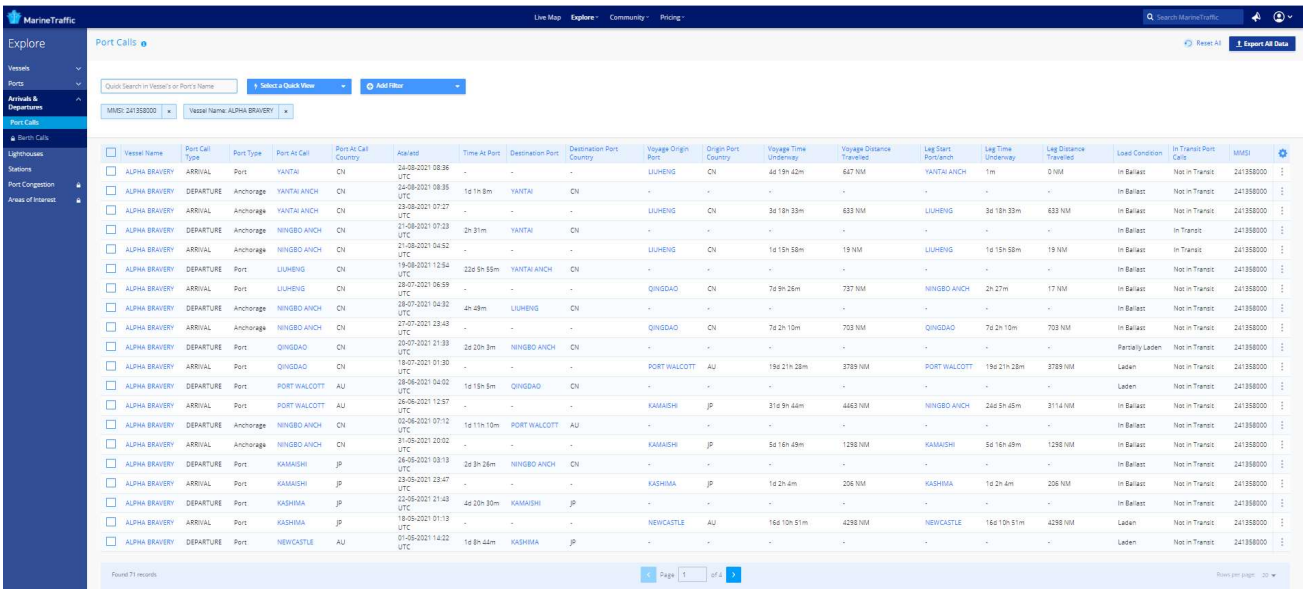

MarineTraffic
Live Map
Explore
Community
Pricing
Explore
Port Calls
Vessels
Ports
Arrivals & Departures
Port Calls
Berth Calls
Lighthouses
Stations
Port Congestion
Areas of Interest
Reset All
Export All Data
Quick Search in Vessel's or Port's Name
Select a Quick View
Add Filter
MMSI: 240834000
Vessel Name: PEGASUS

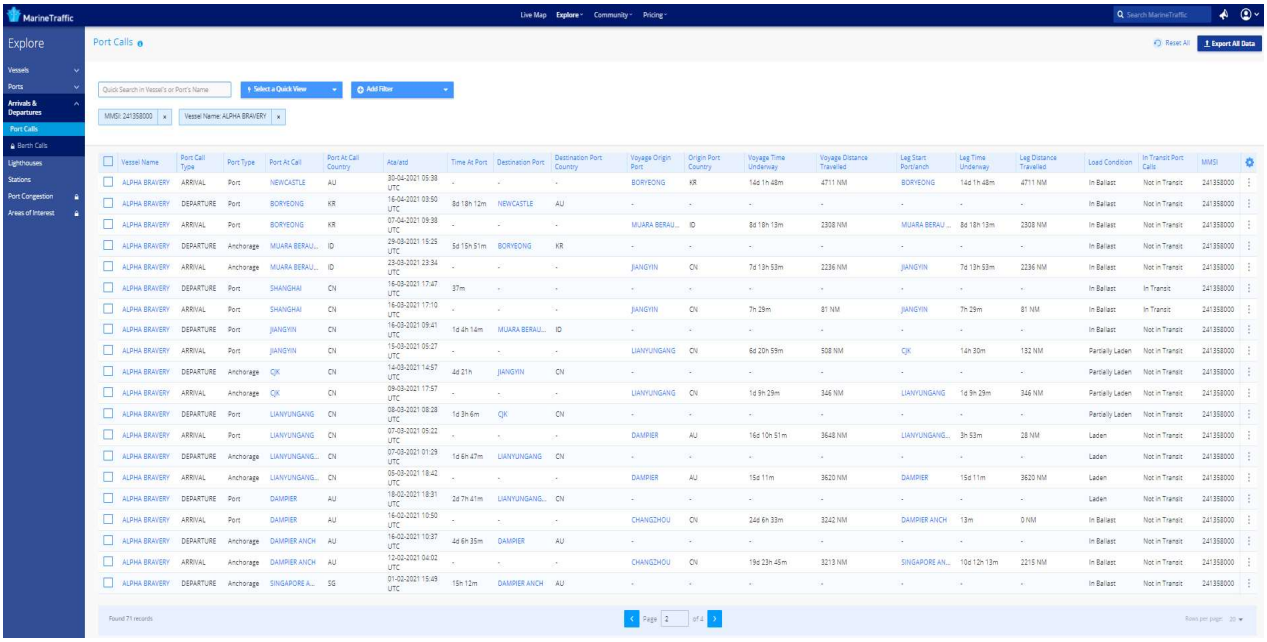

MarineTraffic
Live Map
Explore
Community
Pricing
Explore
Port Calls
Vessels
Ports
Arrivals & Departures
Port Calls
Berth Calls
Lighthouses
Stations
Port Congestion
Areas of Interest
Reset All
Export All Data
Quick Search in Vessel's or Port's Name
Select a Quick View
Add Filter
MMSI: 240834000
Vessel Name: PEGASUS

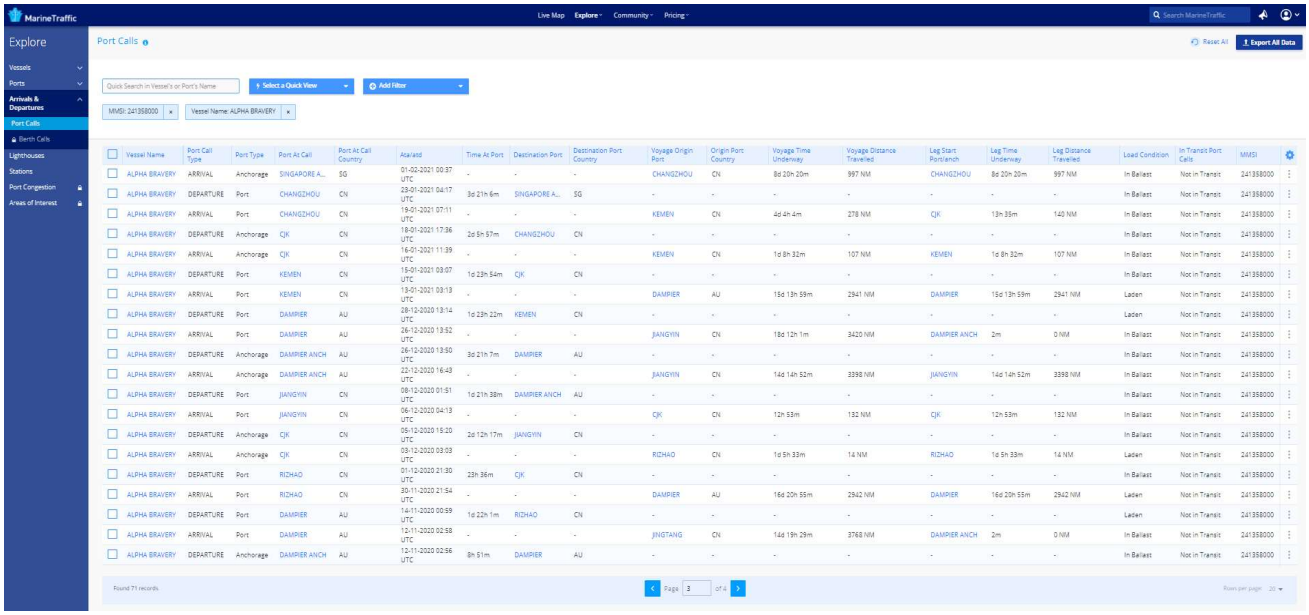
M/T PEGASUS			
Port at Call	**Date of Arrival**	**Date of Departure**	**Time at Port**
Sines	20/8/2021	22/8/2021	1d 23h 20m
Zhoushan	29/5/2021	31/5/2021	2d 1h 4m
Zhanjiang	3/3/2021	8/3/2021	5d 20h 15m
Cap Lopez	24/1/2021	26/1/2021	2d 1h 4m
Fos Sur Mer	22/12/2020	25/12/2020	2d 22h 15m
Forcados Terminal	2/12/2020	5/12/2020	2d 21h 32m
Tema	28/10/2020	30/10/2020	2d 56m
Pointe Noire	12/9/2020	15/9/2020	2d 10h 30m

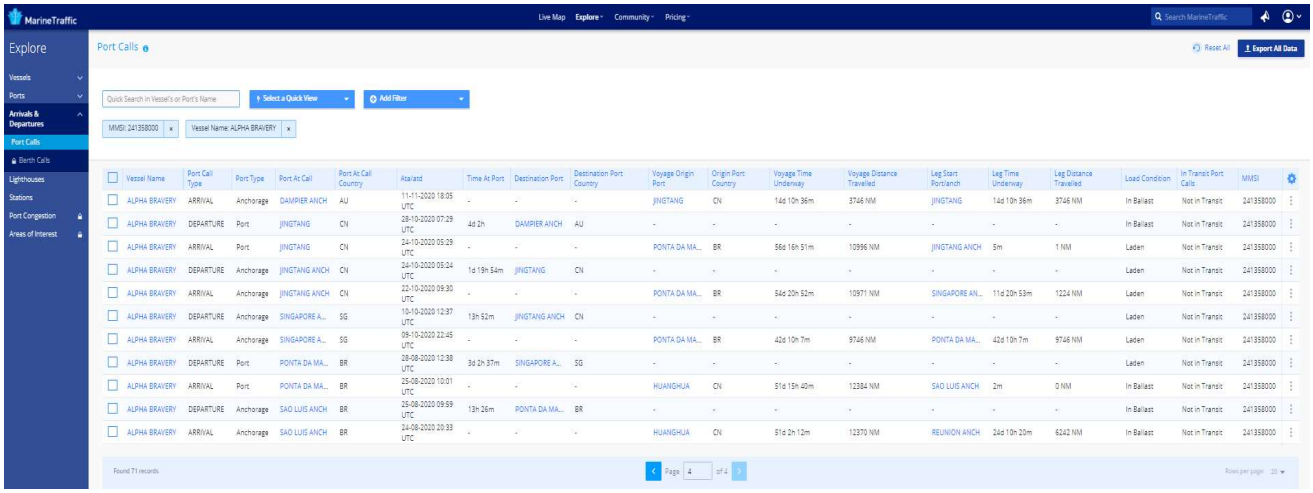
M/T PEGASUS called 8 ports during the last 12 months and spent in total 22 days 4 hours and 55 minutes at ports. Average time of stay duration was 2 days 18 hours and 36 minutes.

4.3.3 M/V ALPHA BRAVERY MARINE TRAFFIC DATA






MarineTraffic
Live Map
Explore
Community
Pricing
Explore
Port Calls
Reset All
Export All Data
Vessels
Ports
Arrivals & Departures
Port Calls
Berth Calls
Lighthouses
Stations
Port Congestion
Areas of Interest
Quick Search in Vessel's or Port's Name
Select a Quick View
Add Filter
MMSI: 241358000
Vessel Name: ALPHA BRAVERY
Vessel Name
Port Call Type
Port Type
Port At Call
Port At Call Country
Ata/atd
Time At Port
Destination Port
Destination Port Country
Voyage Origin Port
Origin Port Country
Voyage Time Underway
Voyage Distance Travelled
Leg Start Port/anch
Leg Time Underway
Leg Distance Travelled
Load Condition
In Transit Port Calls
MMSI
ALPHA BRAVERY ARRIVAL Anchorage SINGAPORE A... SG 01-02-2021 00:37 UTC - - - CHANGZHOU CN 8d 20h 20m 997 NM CHANGZHOU 8d 20h 20m 997 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port CHANGZHOU CN 23-01-2021 04:17 UTC 3d 21h 6m SINGAPORE A... SG - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port CHANGZHOU CN 19-01-2021 07:11 UTC - - - KEMEN CN 4d 4h 4m 278 NM CJK 19h 39m 140 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage CJK CN 18-01-2021 17:36 UTC 2d 5h 57m CHANGZHOU CN - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage CJK CN 16-01-2021 11:39 UTC - - - KEMEN CN 1d 8h 32m 107 NM KEMEN 1d 8h 32m 107 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port KEMEN CN 15-01-2021 03:07 UTC 1d 23h 54m CJK CN - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port KEMEN CN 13-01-2021 03:13 UTC - - - DAMPIER AU 15d 13h 59m 2941 NM DAMPIER 15d 13h 59m 2941 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port DAMPIER AU 28-12-2020 13:14 UTC 1d 23h 22m KEMEN CN - - - - - - - Laden Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port DAMPIER AU 26-12-2020 13:52 UTC - - - JIANGYIN CN 18d 12h 1m 3420 NM DAMPIER ANCH 2m 0 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage DAMPIER ANCH AU 26-12-2020 13:50 UTC 3d 21h 7m DAMPIER AU - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage DAMPIER ANCH AU 22-12-2020 16:43 UTC - - - JIANGYIN CN 14d 14h 52m 3398 NM JIANGYIN 14d 14h 52m 3398 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port JIANGYIN CN 08-12-2020 01:51 UTC 1d 21h 38m DAMPIER ANCH AU - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port JIANGYIN CN 06-12-2020 04:13 UTC - - - CJK CN 12h 53m 132 NM CJK 12h 53m 132 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage CJK CN 05-12-2020 15:20 UTC 2d 12h 17m JIANGYIN CN - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage CJK CN 03-12-2020 03:03 UTC - - - RIZHAO CN 1d 5h 33m 14 NM RIZHAO 1d 5h 33m 14 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port RIZHAO CN 01-12-2020 21:30 UTC 23h 36m CJK CN - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port RIZHAO CN 30-11-2020 21:54 UTC - - - DAMPIER AU 16d 20h 55m 2942 NM DAMPIER 16d 20h 55m 2942 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port DAMPIER AU 14-11-2020 00:59 UTC 1d 22h 1m RIZHAO CN - - - - - - - Laden Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port DAMPIER AU 12-11-2020 02:58 UTC - - - JINGTANG CN 14d 19h 29m 3768 NM DAMPIER ANCH 2m 0 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage DAMPIER ANCH AU 12-11-2020 02:56 UTC 8h 51m DAMPIER AU - - - - - - - In Ballast Not in Transit 241358000
Found 71 records
Page 3 of 4
Rows per page: 20


MarineTraffic
Live Map
Explore
Community
Pricing
Explore
Port Calls
Reset All
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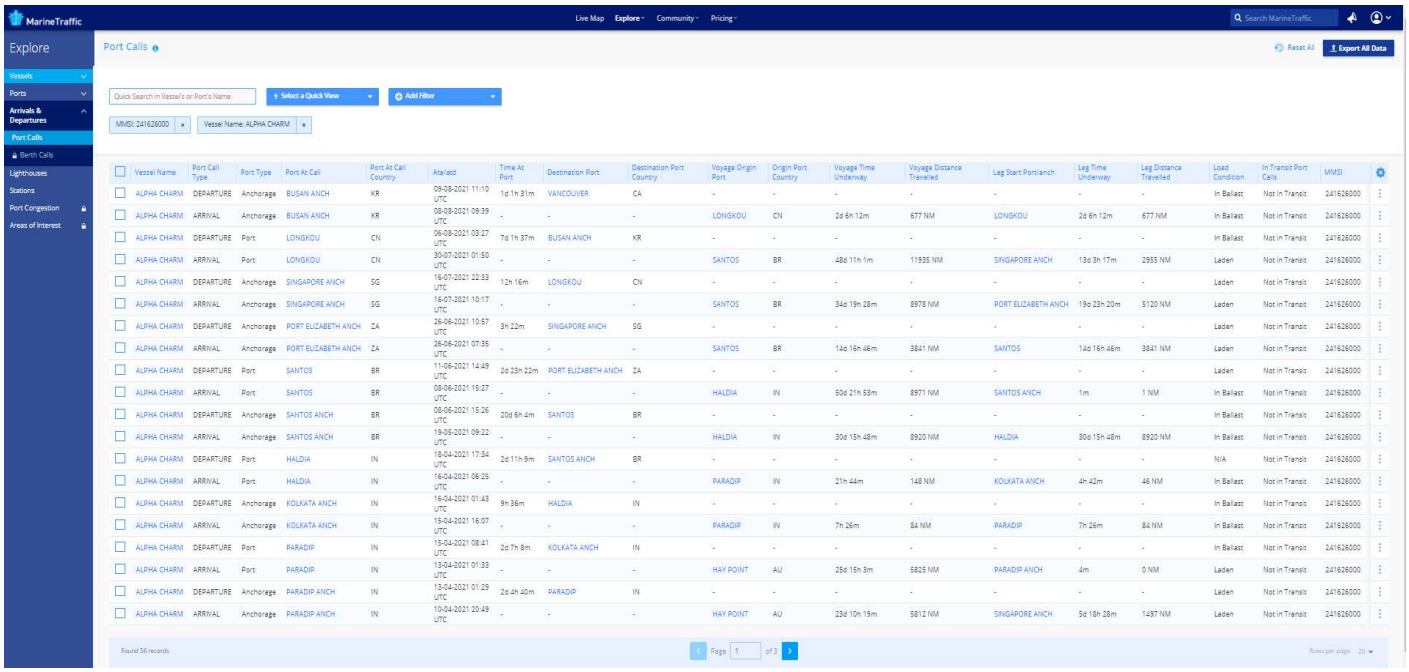
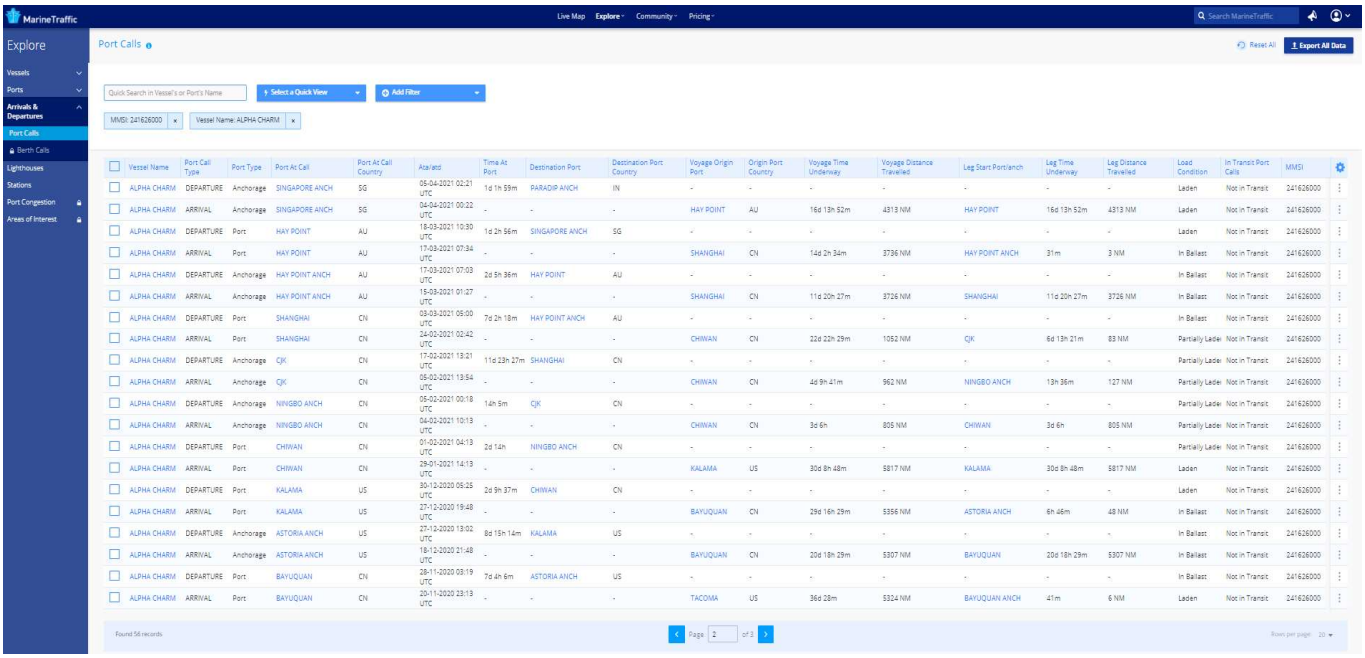
Vessels
Ports
Arrivals & Departures
Port Calls
Berth Calls
Lighthouses
Stations
Port Congestion
Areas of Interest
Quick Search in Vessel's or Port's Name
Select a Quick View
Add Filter
MMSI: 241358000
Vessel Name: ALPHA BRAVERY
Vessel Name
Port Call Type
Port Type
Port At Call
Port At Call Country
Ata/atd
Time At Port
Destination Port
Destination Port Country
Voyage Origin Port
Origin Port Country
Voyage Time Underway
Voyage Distance Travelled
Leg Start Port/anch
Leg Time Underway
Leg Distance Travelled
Load Condition
In Transit Port Calls
MMSI
ALPHA BRAVERY ARRIVAL Anchorage DAMPIER ANCH AU 11-11-2020 18:05 UTC - - - JINGTANG CN 14d 10h 36m 3746 NM JINGTANG 14d 10h 36m 3746 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port JINGTANG CN 28-10-2020 07:29 UTC 4d 2h DAMPIER ANCH AU - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port JINGTANG CN 24-10-2020 05:29 UTC - - - PONTA DA MA... BR 56d 16h 51m 10996 NM JINGTANG ANCH 5m 1 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage JINGTANG ANCH CN 24-10-2020 05:24 UTC 1d 19h 54m JINGTANG CN - - - - - - - Laden Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage JINGTANG ANCH CN 22-10-2020 09:30 UTC - - - PONTA DA MA... BR 54d 20h 52m 10971 NM SINGAPORE AN... 11d 20h 53m 1224 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage SINGAPORE A... SG 10-10-2020 12:37 UTC 13h 52m JINGTANG ANCH CN - - - - - - - Laden Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage SINGAPORE A... SG 09-10-2020 22:45 UTC - - - PONTA DA MA... BR 42d 10h 7m 9746 NM PONTA DA MA... 42d 10h 7m 9746 NM Laden Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Port PONTA DA MA... BR 28-08-2020 12:38 UTC 3d 2h 37m SINGAPORE A... SG - - - - - - - Laden Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Port PONTA DA MA... BR 25-08-2020 10:01 UTC - - - HUANGHUA CN 51d 15h 40m 12384 NM SAO LUIS ANCH 2m 0 NM In Ballast Not in Transit 241358000
ALPHA BRAVERY DEPARTURE Anchorage SAO LUIS ANCH BR 25-08-2020 09:59 UTC 13h 26m PONTA DA MA... BR - - - - - - - In Ballast Not in Transit 241358000
ALPHA BRAVERY ARRIVAL Anchorage SAO LUIS ANCH BR 24-08-2020 20:33 UTC - - - HUANGHUA CN 51d 2h 12m 12370 NM REUNION ANCH 24d 10h 20m 6242 NM In Ballast Not in Transit 241358000
Found 71 records
Page 4 of 4
Rows per page: 20

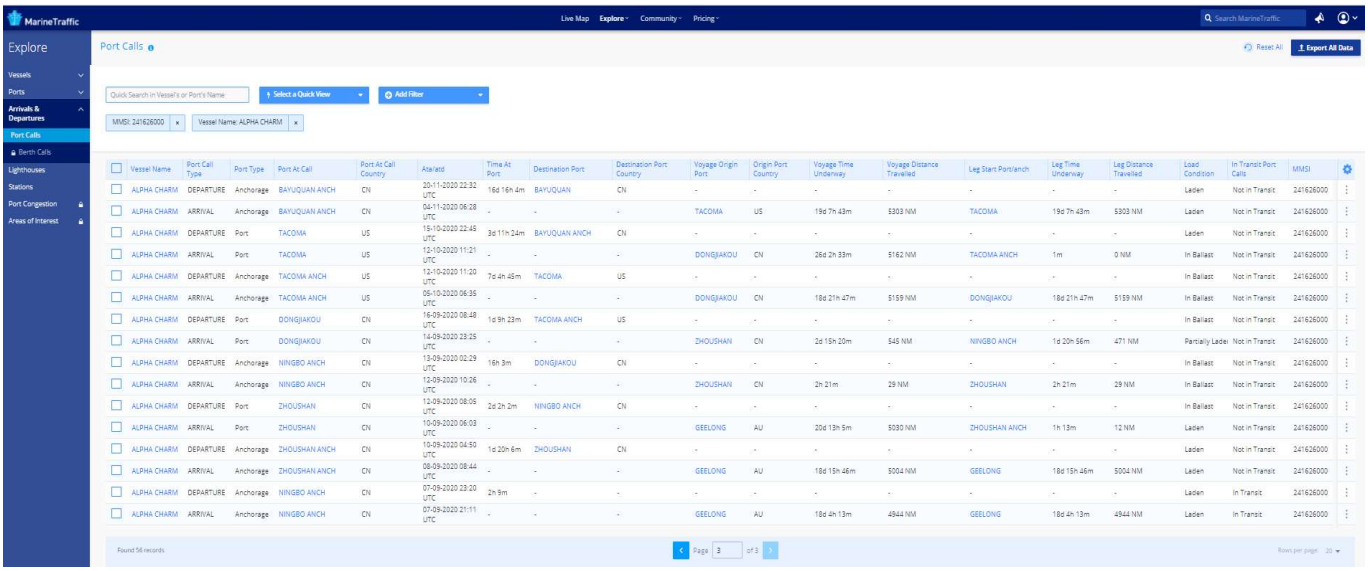
M/V ALPHA BRAVERY			
Port at Call	**Date of Arrival**	**Date of Departure**	**Time at Port**
Yantai	24/8/2021	26/8/2021	1d 17h 1m
Liuheng	28/7/2021	19/8/2021	22d 5h 55m
Qinqdao	20/7/2021	22/7/2021	2d 20h 3m
Walcott	26/6/2021	28/6/2021	1d 15h 5m
Kamaishi	23/5/2021	26/5/2021	2d 3h 26m
Kashima	18/5/2021	22/5/2021	4d 20h 30m
Newcastle	30/4/2021	1/5/2021	1d 18h 12m
Boreyong	7/4/2021	16/4/2021	8d 18h 12m
Jiangyin	15/3/2021	16/3/2021	1d 4h 14m
Lianyungang	7/3/2021	8/3/2021	1d 6h 47m
Dampier	16/2/2021	18/2/2021	2d 7h 41m
Lianyungang	7/3/2021	8/3/2021	1d 6h 47m
Changzhou	19/1/2021	23/1/2021	3d 21h 6m
Kemen	19/1/2021	23/1/2021	3d 21h 6m
Dampier	26/12/2020	28/12/2020	3d 21h 7m
Jiangyin	6/12/2020	8/12/2020	1d 21h 38m
Rizhao	1/12/2020	3/12/2020	2d 12h 17m
Dampier	12/11/2020	14/11/2020	1d 22h 1m
Jingtang	24/10/2020	28/10/2020	4d 2h
Ponta da Madeira	25/08/2020	28/08/2020	3d 2h 37m

M/V ALPHA BRAVERY called 20 ports during the last 12 months and spent in total 76 days 3 hours and 45 minutes at ports with average duration of stay of 3 days 20 hours and 9 minutes. It is obvious that vessel calls standard ports due to a contract of affreightment between company and charterers.

4.3.4 M/V ALPHA CHARM MARINE TRAFFIC DATA







M/V ALPHA CHARM			
Port at Call	**Date of Arrival**	**Date of Departure**	**Time at Port**
Longkou	30/7/2021	6/8/2021	7d 1h 37m
Santos	8/6/2021	11/6/2021	2d 23h 22m
Haldia	16/4/2021	18/4/2021	2d 11h 9m
Paradip	13/4/2021	15/4/2021	2d 7h 8m
Hay Point	17/3/2021	18/3/2021	1d 2h 56m
Shanghai	24/2/2021	3/3/2021	7d 2h 18m
Chiwan	29/1/2021	1/2/2021	2d 14h
Kalama	27/12/2020	30/12/2020	2d 9h 37m
Bayuquan	20/11/2020	28/11/2020	7d 4h 6m
Tacoma	12/10/2020	15/10/2020	3d 11h 24m
Dongjiakou	14/9/2020	16/9/2020	1d 9h 23m
Zhoushan	10/9/2020	12/9/2020	2d 2h 2m

M/V ALPHA CHARM made 12 port calls during the last 12 months with total time spend on ports was 44 days 13 hours and 2 minutes. While average duration of stay was 3 days 16 hours and 48 minutes.

4.3.5 SUMMARY TABLE OF MARINE TRAFFIC DATA

VESSEL NAME	PORT CALLS	TIME SPENT ON PORTS	AVERAGE DURATION OF STAY PER CALL
M/T CAESAR	12	30d 16h 21m	1d 9h 40m
M/T PEGASUS	8	22d 4h 55m	2d 18h 36m
M/V ALPHA BRAVERY	20	76d 3h 45m	3d 20h 9m
M/V ALPHA CHARM	12	44d 13h 2m	3d 16h 48m

5.1 CASE STUDY – OPS CALCULATION TOOL

On May 2017 the International Association of Ports and Harbors decided to set up the World Ports Sustainability Program (WPSP) which scope is to enhance and coordinate future sustainability efforts of ports worldwide and foster international cooperation with partners in the supply chain. The American Association of Port Authorities (AAPA), the European Sea Ports Organization (ESPO), the International Association of Cities and Ports (AIVP) and the World Association for Waterborne Transport Infrastructure (PIANC) signed up as strategic partners of the World Ports Sustainability Program.

One of the program's projects is the OPS calculation tool which is a simple calculation tool that helps develop an estimation for the costs and benefits of OPS. Its main goals are to calculate the annual costs and benefits of OPS and the annual emission reduction. Also, the tool permits estimation of the effects of different parameters on costs and emissions, thus providing insight into cost effectiveness.

5.1 OPS CALCULATION TOOL MANUAL

As mentioned, tool can be used to calculate emission reductions, financial costs and benefits and emission benefits on an annual basis. The tool calculates the additional annual costs for the integral OPS project and not for individual parties such as vessel, companies, terminal/ports.

The tool contains three sheets with calculations for different vessel types and one sheet with basic data. The former sheets contain input data (operational and cost data) and formulae for calculating annual costs and emissions reductions. Further down, general data, investment costs and operational costs can be filled in. For comparison, OPS and use of auxiliary engines are listed in parallel. Input data can be filled out in the white-colored cells. All these cells can be changed according to your particular preferences and used to estimate the effect of certain choices.

Below, a stepwise manual for working with the tool is provided. The capital letters indicated can be found in the left-hand side of the tool.

A	Under “General information”, data can be entered on how frequently ships are berthed and for how long. These data are needed to calculate operational costs and emission changes.
B	Depreciation period and interest rate affect annual costs, with higher interest rates and shorter depreciation periods leading to higher annual costs.
C	Here the investments costs at the terminal can be filled in. The tool distinguishes various cost categories, which are summed to yield the total investment costs. Annual costs are calculated using the interest rate and depreciation period. Investment costs are not relevant for the auxiliary engines, as these are vital outside the ports.
D	In this section the shipside investments costs are filled in. A range of cost categories are listed, which are summed to yield the total investment costs. Annual costs are calculated using the interest rate and depreciation period.
E	The operational costs depend on fuel and electricity consumption levels, fuel and electricity prices and electricity taxes. From these data, annual costs are calculated. Savings on auxiliary engine maintenance costs can be filled in here, with negative costs standing for benefits. The total benefits are calculated from the number of hours at berth, as input to the General information section. There is an option to calculate with a CO2 price in advance. This option enables simulation of the influence of inclusion of the Maritime industry in the EU ETS on the cost effectiveness of OPS.
F	The total annual costs are calculated by summing the various cost categories under B to F. The costs or benefits accruing from using OPS can be calculated by comparing the ‘auxiliary engine costs’ with the ‘OPS costs’ (row 65), the outcome of which is presented in Box I.
G	The emission benefits are calculated by using emission factors from the data section and total annual consumption figures. Total annual consumption is calculated on the basis of the ships’ consumption and the number and duration of port calls. The emission benefits can be

	found by comparing the figures in rows 76-80. The type of fuel can be changed from diesel to HFO here, as well as the energy source used for power generation (by clicking on a pull-down menu)
H	The total annual costs can be calculated by subtracting the 'auxiliary engine costs' from the 'OPS costs. Negative costs mean that OPS yields a financial benefit. The cost effectiveness is expressed in Euro per unit of pollution. Pollution units are used to sum the various air pollutants, with SO2 and PM being judged to be 2.2 and 12.8 times more harmful on the basis of a study by AEA Technology (2005).
I	For each pollutant the relative emission reduction is calculated using the figures in rows 76-80.

Note: the basic data can be changed in the 'data' sheet. These basic data include emission factors for fuel burning and power consumption.

Also, in the cost effectiveness calculation, costs are balanced against the total amount of air pollutants prevented. Figures for the relative harmfulness of air pollutants have been taken from a study by AEA technology. Because of their more damaging nature, SO2 and PM have been assigned a higher weighting factor. The calculation algorithm is as follows: pollution units (tons) = 1* NOx (tonne) + 2,2 * SO2 (tonne) + 12.8 * PM (tonne). The cost effectiveness is expressed in € per pollution unit).

In our cases, investment costs for terminals and ships were taken by other studies and published letters. Investment costs for terminal are common for all four cases studies, taking into account that terminal should be able to service at least four vessels at the same time. Regarding investment cost ships, each vessel has different costs reflecting its demands, size, and collected voyage data.

Operational costs include:

- Electricity price (€/kWh) = 0.18 as per Eurostat statistics (for second half 2020) and it is the highest price in EU (Germany) for industries.
- Tax (€/kWh) = 0.05 as per Eurostat statistics
- Consumption (kW) is a ship specific parameter and is different for each vessel.
- Maintenance per engine (€/h) = -3.0 as per article: **Technical analysis and economic evaluation of a complex shore-to-ship power supply system, DanieleColarossi,PaoloPrincipihttps://www.sciencedirect.com/science/article/pii/S1359431120334700?via%3Dihub**

- Number of Engines is a ship specific parameter and is different for each vessel.
- Diesel ($/ton) = 650$/ton as per www.shipandbunker.com which shows the live price of world bunker prices. 650$/ton is Marine Gas Oil (MGS) price of Rotterdam.
- Consumption (ton/h) is a ship specific parameter which depends on size, age of vessel and was figured out by collected data.
- ETS CO2 price: An ETS is an explicit carbon pricing instrument that limits or caps the allowed amount of GHG emissions and lets market forces disclose the carbon price through emitters trading emissions allowances. As per Environmental Defense Fund (EDF)'s case study on 2015, the price is approx. 50 $ / ton.

5.2 OPS CASE STUDY

5.2.1 MOTOR TANKER, 3 MVA CONNECTION 150.000 GT

Motor Tanker, 3 MVA connection 150.000 GT

A **General information**

ships	4
calls per year per ship	12
hours at berth connected	34

OPS

INVESTMENT COSTS

	Input	Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	1.000.000	
freq. converter (€)	400.000	
cable installation (€)	250.000	471.682
total investments (€)	1.650.000	
maintenance, contract and electricity transport costs (15%) (€)	247.500	
D **investment costs ships**		
transformer (€)	250.000	
main swithboard, control panel (€)	100.000	256.519
cabling (€)	2.000	
cable reel system (€)	120.000	
total investments (€)	472.000	

OPERATIONAL COSTS

	Input	Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	450.432
Consumption (kW)	1.200	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-24480
number of engines	3	
F TOTAL COSTS (€)		1.154.153

POLLUTION

G Input		pollution units
Electricity source	wind/water/nuclear	

Pollutants	Emissions (ton)	Pollution units
CO2	0,0	
NOx	0,0	0
PM	0,0	0
SO2	0,0	0
Total		0

Auxiliary engines

INVESTMENT COSTS

	Input terminal	Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

	Input terminal	Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	
Consumption (ton/h)	0,45	315.058
ETS costs		
ETS CO2 price	50	3456
		318.514

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	2350,1	
NOx	49,9	49.939
PM	1,5	19.741
SO2	3,7	8.078
Total		77.758

H

Total yearly costs (€)	**835.639**
cost effectiveness (€ / pollution unit)	**10,7**

I

Emission reductions electricity	
NOx	100%
PM	100%
SO2	100%
CO2	100%

Motor Tanker, 3 MVA connection 150.000 GT

A **General information**

ships	4
calls per year per ship	12
hours at berth connected	34

OPS

INVESTMENT COSTS

Input		Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	1.000.000	
freq, converter (€)	400.000	
cable installation (€)	250.000	
total investments (€)	1.650.000	
maintenance, contract and electricity transport costs (15%) (€)	247.500	
D **investment costs ships**		
transformer (€)	250.000	
main swithboard, control panel (€)	100.000	256.519
cabling (€)	2.000	
cable reel system (€)	120.000	
total investments (€)	472.000	

OPERATIONAL COSTS

Input		Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	450.432
Consumption (kW)	1.200	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-24480
number of engines	3	
F **TOTAL COSTS (€)**		1.154.153

POLLUTION

Input		pollution units
G Electricity source	EU mix	

Pollutants	Emissions (ton)	Pollution units
CO2	685,4	
NOx	0,7	68%
PM	0,0	7%
SO2	0,9	1.982
Total		2.743

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	315.058
Consumption (ton/h)	0,45	
ETS costs		
ETS CO2 price	50	3456
		318.514

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	2350,1	
NOx	49,9	49.939
PM	1,5	19.741
SO2	3,7	8.078
Total		77.758

H

Total yearly costs (€)	**835.639**
cost effectiveness (€ / pollution unit)	**11,1**

I

Emission reductions electricity	
NOx	99%
PM	100%
SO2	75%
CO2	71%

5.2.2 MOTOR TANKER, 2.5 MVA CONNECTION 80.000 GT

Motor Tanker, 2,5 MVA connection 80.000 GT

A **General information**

ships	4
calls per year per ship	8
hours at berth connected	46

OPS

INVESTMENT COSTS

Input		Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	750.000	
freq. converter (€)	400.000	
cable installation (€)	220.000	391.639
total investments (€)	1.370.000	
maintenance, contract and electricity transport costs (15%) (€)	205.500	
D **investment costs ships**		
transformer (€)	180.000	
main swithboard, control panel (€)	100.000	196.737
cabling (€)	2.000	
cable reel system (€)	80.000	
total investments (€)	362.000	

OPERATIONAL COSTS

Input		Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	236.992
Consumption (kW)	700	
Saved maintenance		
Maintainance per engine (€/ h)	-5	
number of engines	3	-22080
– TOTAL COSTS (€)		803.288

POLLUTION

Input		pollution units
G		
Electricity source	wind/water/nuclear	

Pollutants	Emissions (ton)	Pollution units
CO2	0,0	
NOx	0,0	0
PM	0,0	0
SO2	0,0	0
Total		0

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	
Consumption (ton/h)	0,25	157.872
ETS costs		
ETS CO2 price	50	1280
		159.152

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	1177,6	
NOx	25,0	25.034
PM	0,8	9.892
SO2	1,8	4.048
Total		38.964

H

Total yearly costs (€)	**644.136**
cost effectiveness (€ / pollution unit)	**16,5**

I

Emission reductions electricity	
NOx	100%
PM	100%
SO2	100%
CO2	100%

Motor Tanker, 2,5 MVA connection 80.000 GT

A **General information**

ships	4
calls per year per ship	8
hours at berth connected	46

OPS

INVESTMENT COSTS

B **General info investement**

Input		Yearly costs (€)
interest rate	6%	
depreciation (years)	10	

C **investment costs terminal**

high voltage connection from grid (including transformer) (€)	750.000	
freq, converter (€)	400.000	
cable installation (€)	220.000	391.639
total investments (€)	1.370.000	
maintenance, contract and electricity transport costs (15%) (€)	205.500	

D **investment costs ships**

transformer (€)	180.000	
main swithboard, control panel (€)	100.000	196.737
cabling (€)	2.000	
cable reel system (€)	80.000	
total investments (€)	362.000	

OPERATIONAL COSTS

E

Input		Yearly costs (€)
Electricity costs		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	236.992
Consumption (kW)	700	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-22080
number of engines	3	

F **TOTAL COSTS (€)** 803.288

POLLUTION

G

Input		pollution units
Electricity source	EU mix	

Pollutants	Emissions (ton)	Pollution units
CO2	360,6	
NOx	0,4	361
PM	0,0	40
SO2	0,5	1.043
Total		1.443

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		

investment costs terminal

no investments		

investment costs ships

no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	
Consumption (ton/h)	0,25	157.872
ETS costs		
ETS CO2 price	50	1280
		159.152

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	1177,6	
NOx	25,0	25.024
PM	0,8	9.892
SO2	1,8	4.048
Total		38.964

H

Total yearly costs (€)	644.136
cost effectiveness (€ / pollution unit)	17,2

I

Emission reductions electricity	
NOx	99%
PM	100%
SO2	74%
CO2	69%

5.2.3 BULK CARRIER, 2.0 MVA CONNECTION 95.000 GT

Bulk Carrier, 2,0 MVA connection 95.000 GT

A **General information**

ships	4
calls per year per ship	20
hours at berth connected	92

OPS

INVESTMENT COSTS

Input		Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	600.000	
freq, converter (€)	250.000	
cable installation (€)	225.000	307.308
total investments (€)	1.075.000	
maintenance, contract and electricity transport costs (15%) (€)	161.250	
D **investment costs ships**		
transformer (€)	150.000	
main swithboard, control panel (€)	75.000	158.422
cabling (€)	1.500	
cable reel system (€)	65.000	
total investments (€)	291.500	

OPERATIONAL COSTS

Input		Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	710.976
Consumption (kW)	420	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-110400
number of engines	3	
F TOTAL COSTS (€)		1.066.306

POLLUTION

Input		pollution units
G Electricity source	wind/water/nuclear	

Pollutants	Emissions (ton)	Pollution units
CO2	0,0	
NOx	0,0	0
PM	0,0	0
SO2	0,0	0
Total		0

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	442.042
Consumption (ton/h)	0,14	
ETS costs		
ETS CO2 price	50	1792
		443.834

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	3297,3	
NOx	70,1	70.067
PM	2,2	27.697
SO2	5,2	11.334
Total		109.099

H

Total yearly costs (€)	622.472
cost effectiveness (€ / pollution unit)	5,7

I

Emission reductions electricity	
NOx	100%
PM	100%
SO2	100%
CO2	100%

Bulk Carrier, 2,0 MVA connection 95.000 GT

A **General information**

ships	4
calls per year per ship	20
hours at berth connected	92

OPS

INVESTMENT COSTS

Input		Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	600.000	
freq, converter (€)	250.000	
cable installation (€)	225.000	307.308
total investments (€)	1.075.000	
maintenance, contract and electricity transport costs (15%) (€)	161.250	
D **investment costs ships**		
transformer (€)	150.000	
main swithboard, control panel (€)	75.000	158.422
cabling (€)	1.500	
cable reel system (€)	65.000	
total investments (€)	291.500	

OPERATIONAL COSTS

Input		Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	710.976
Consumption (kW)	420	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-110400
number of engines	3	
F **TOTAL COSTS (€)**		1.066.306

POLLUTION

Input		pollution units
G Electricity source	EU mix	

Pollutants	Emissions (ton)	Pollution units
CO2	1081,9	
NOx	1,1	1.082
PM	0,0	119
SO2	1,4	3.128
Total		4.329

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	442.042
Consumption (ton/h)	0,14	
ETS costs		
ETS CO2 price	50	1792
		443.834

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	3297,3	
NOx	70,1	70.067
PM	2,2	27.697
SO2	5,2	11.334
Total		109.099

H

Total yearly costs (€)	**622.472**
cost effectiveness (€ / pollution unit)	**5,9**

I

Emission reductions electricity	
NOx	98%
PM	100%
SO2	72%
CO2	67%

5.2.4 BULK CARRIER, 1.5 MVA CONNECTION 45.000 GT

Bulk Carrier, 1,5 MVA connection 95000 GT

A **General information**

ships	4
calls per year per ship	12
hours at berth connected	88

OPS

INVESTMENT COSTS

Input		Yearly costs (€)
B **General info investement**		
interest rate	6%	
depreciation (years)	10	
C **investment costs terminal**		
high voltage connection from grid (including transformer) (€)	500.000	
freq, converter (€)	200.000	
total investments (€)	900.000	
maintenance, contract and electricity transport costs (15%) (€)	135.000	
D **investment costs ships**		
transformer (€)	100.000	
main swithboard, control panel (€)	50.000	109.347
cabling (€)	1.200	
cable reel system (€)	50.000	
total investments (€)	201.200	

OPERATIONAL COSTS

Input		Yearly costs (€)
E **Electricity costs**		
Electricity price (€/ kWh)	0,18	
tax (€/ kWh)	0,05	388.608
Consumption (kW)	400	
Saved maintenance		
Maintainance per engine (€/ h)	-5	-63360
number of engines	3	
F **TOTAL COSTS (€)**		691.876

POLLUTION

Input		pollution units
G Electricity source	wind/water/nuclear	

Pollutants	Emissions (ton)	Pollution units
CO2	0,0	
NOx	0,0	0
PM	0,0	0
SO2	0,0	0
Total		0

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	126.847
Consumption (ton/h)	0,07	
ETS costs		
ETS CO2 price	50	537,6
		127.384

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	946,2	
NOx	20,1	20.106
PM	0,6	7.948
SO2	1,5	3.252
Total		31.307

H

Total yearly costs (€)	**564.491**
cost effectiveness (€ / pollution unit)	**18,0**

I

Emission reductions electricity	
NOx	100%
PM	100%
SO2	100%
CO2	100%

Bulk Carrier, 1,5 MVA connection 45.000 GT

A	**General information**		
	ships	4	
	calls per year per ship	12	
	hours at berth connected	88	

OPS

INVESTMENT COSTS

	Input		Yearly costs (€)
B	**General info investement**		
	interest rate	6%	
	depreciation (years)	10	
C	**investment costs terminal**		
	high voltage connection from grid (including transformer) (€)	500.000	
	freq, converter (€)	200.000	
	cable installation (€)	200.000	257.281
	total investments (€)	900.000	
	maintenance, contract and electricity transport costs (15%) (€)	135.000	
D	**investment costs ships**		
	transformer (€)	100.000	
	main swithboard, control panel (€)	50.000	109.347
	cabling (€)	1.200	
	cable reel system (€)	50.000	
	total investments (€)	201.200	

OPERATIONAL COSTS

	Input		Yearly costs (€)
E	**Electricity costs**		
	Electricity price (€/ kWh)	0,18	
	tax (€/ kWh)	0,05	388.608
	Consumption (kW)	400	
	Saved maintenance		
	Maintainance per engine (€/ h)	-5	-63360
	number of engines	3	
F	**TOTAL COSTS (€)**		691.876

POLLUTION

G	Input		pollution units
	Electricity source	EU mix	

Pollutants	Emissions (ton)	Pollution units
CO2	591,4	
NOx	0,6	591
PM	0,0	65
SO2	0,8	1.710
Total		2.366

Auxiliary engines

INVESTMENT COSTS

Input terminal		Yearly costs (€)
General info		
no investments		
investment costs terminal		
no investments		
investment costs ships		
no investments		

OPERATIONAL COSTS

Input terminal		Yearly costs (€)
Fuel costs		
Diesel (USD/ton)	650	126.847
Consumption (ton/h)	0,07	
ETS costs		
ETS CO2 price	50	537,6
		127.384

POLLUTION

Input		pollution units
Fuel	Diesel	

Pollutants	Emissions (ton)	Pollution units
CO2	946,2	
NOx	20,1	20.106
PM	0,6	7.948
SO2	1,5	3.252
Total		31.307

H	**Total yearly costs (€)**	564.491
	cost effectiveness (€ / pollution unit)	19,5

I

Emission reductions electricity	
NOx	97%
PM	99%
SO2	47%
CO2	38%

6.0 CONCLUSION

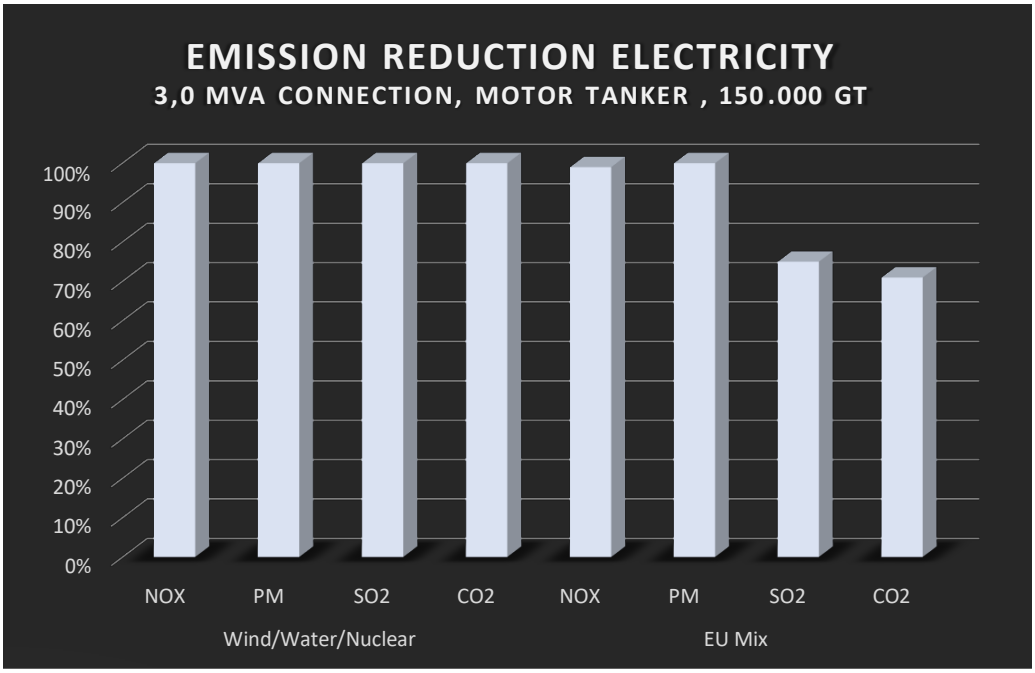
Based on the OPS calculation tool results, we can draw conclusions pertaining both possible emissions reduction and financial costs. As already mentioned in the previous chapter, the tool calculates the additional annual costs for the integral OPS project and not for individual parties. Deeper analysis in each involved party could give a better analysis and safer conclusions regarding financial costs and feasibility of investment.

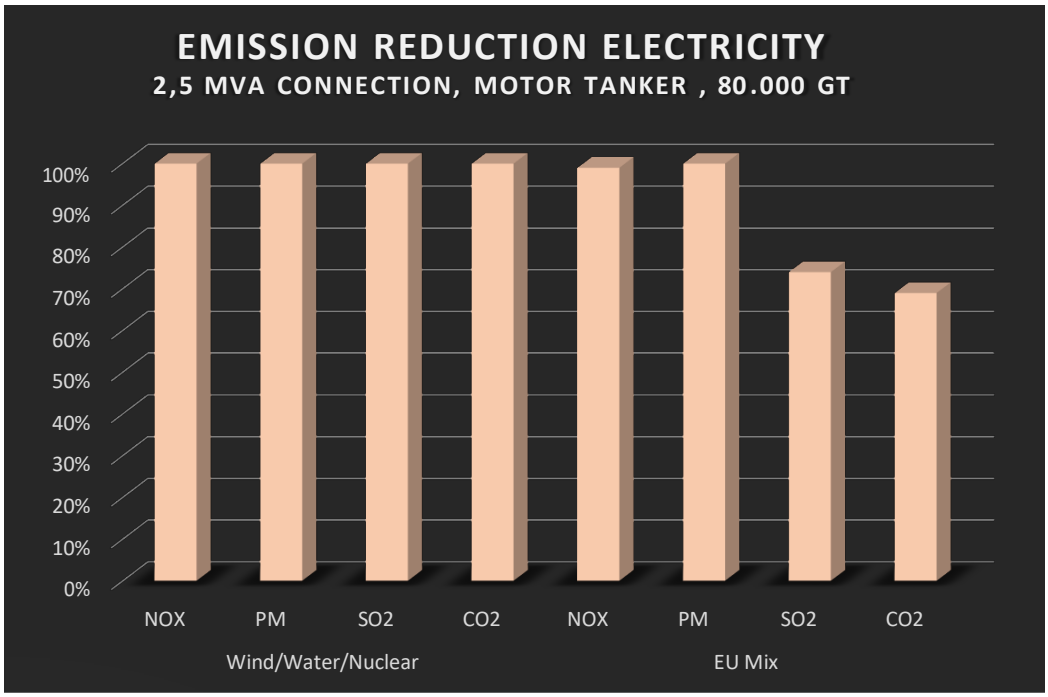
6.1 EMISSION REDUCTION

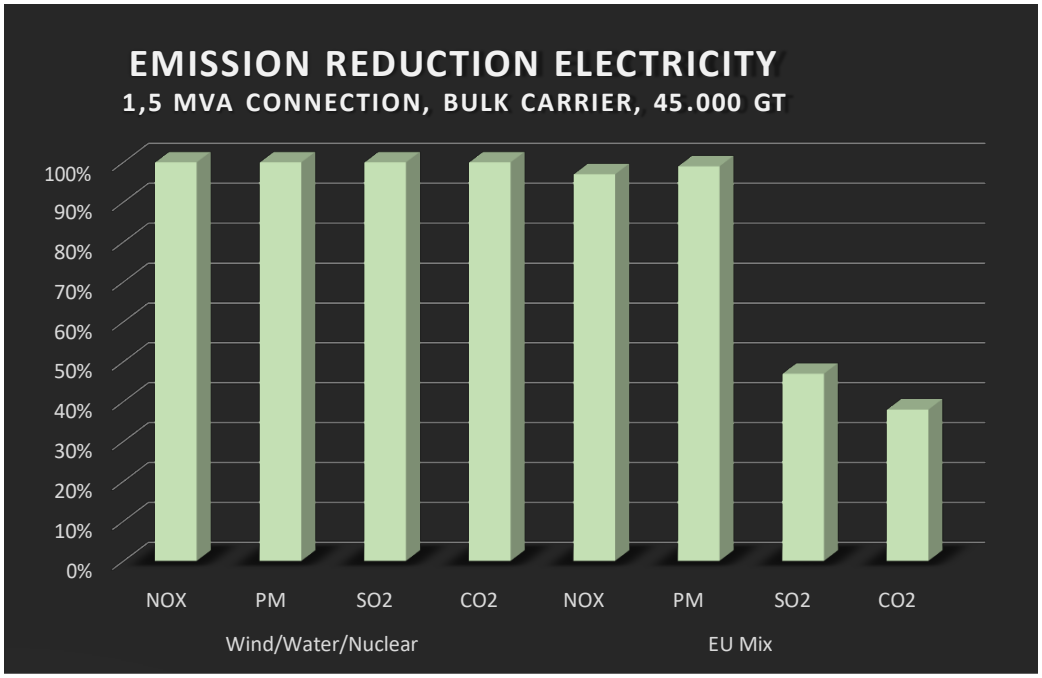
EMISSION REDUCTION ELECTRICITY			
TANKER 3 MVA CONNECTION 150.000 GT	Wind/Water/Nuclear	NO_x	100%
		PM	100%
		SO_2	100%
		CO_2	100%
	EU Mix	NO_x	99%
		PM	100%
		SO_2	75%
		CO_2	71%
TANKER 2,5 MVA CONNECTION 80.000 GT	Wind/Water/Nuclear	NO_x	100%
		PM	100%
		SO_2	100%
		CO_2	100%
	EU Mix	NO_x	99%
		PM	100%
		SO_2	74%
		CO_2	69%
BULK CARRIER 2,0 MVA CONNECTION 95.000 GT	Wind/Water/Nuclear	NO_x	100%
		PM	99%
		SO_2	74%
		CO_2	69%
	EU Mix	NO_x	98%
		PM	100%
		SO_2	72%
		CO_2	67%
BULK CARRIER 1,5 MVA CONNECTION 45.000 GT	Wind/Water/Nuclear	NO_x	100%
		PM	100%
		SO_2	100%
		CO_2	100%
	EU Mix	NO_x	97%
		PM	99%
		SO_2	47%
		CO_2	38%

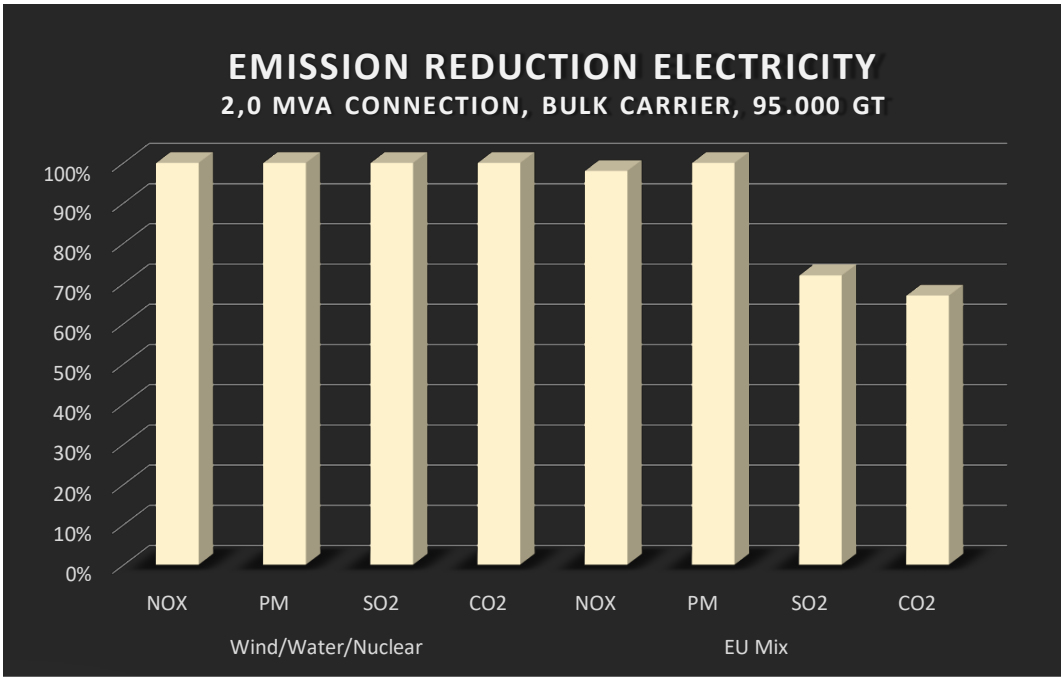
Table is shown the results in emissions reduction due to installation of Cold Ironing in our cases. Undoubtedly, environmental benefits are significant, especially in case of renewable resources exploitation for the generation of electrical power, where all emission are dropping by 100%. Results are positive also in the case of EU mix for electricity production against vessel's diesel generator. In most of cases emissions are reduced more than 40% up to 99%.

Thus, installation of Cold Ironing in ports could lead to great benefits both for environment and society health which are totally interconnected. Cold Ironing is the fastest method in terms of measurable results in air pollution abatement.




EMISSION REDUCTION ELECTRICITY
2,5 MVA CONNECTION, MOTOR TANKER , 80.000 GT
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
NOX
PM
SO2
CO2
NOX
PM
SO2
CO2
Wind/Water/Nuclear
EU Mix


EMISSION REDUCTION ELECTRICITY
1,5 MVA CONNECTION, BULK CARRIER, 45.000 GT
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
NOX
PM
SO2
CO2
NOX
PM
SO2
CO2
Wind/Water/Nuclear
EU Mix



6.2 FINANCIAL COSTS AND BENEFITS

Except environmental benefits, potential cost effectiveness is another key factor in decision of applying cold ironing in modern ports. Total amount of investment and running costs among the involved parties could give safe results. A breakdown of individual costs, such as shore side, vessel, countries and shipping companies are necessary in case of implementation of method.

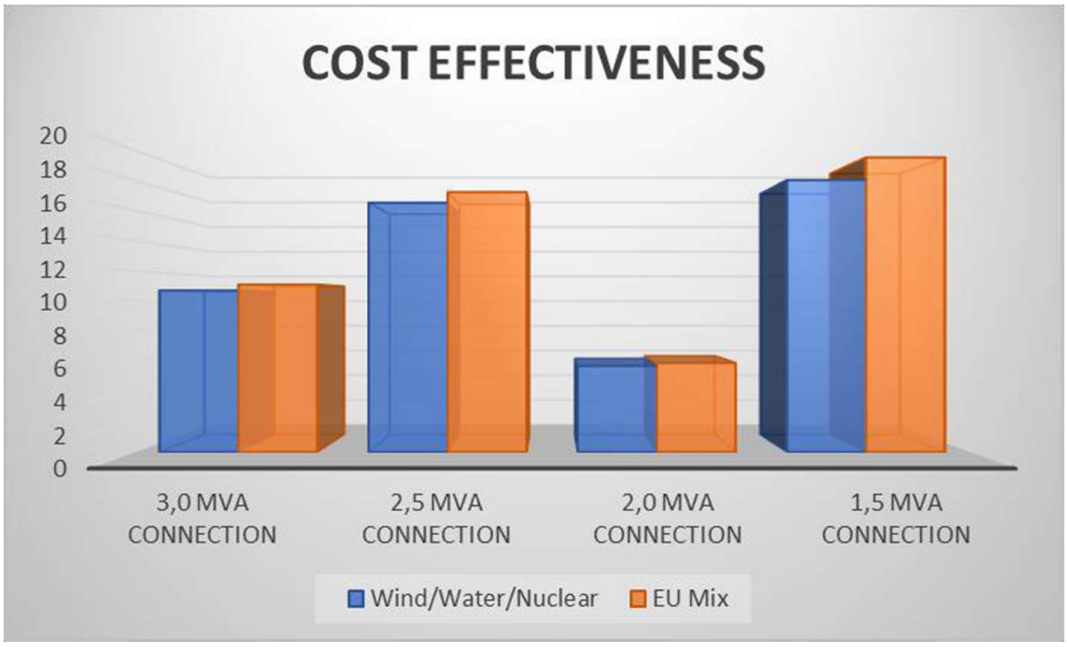
Also, Cold ironing is directly connected with global market. Diesel and electricity price of area are playing a major role in the decision.

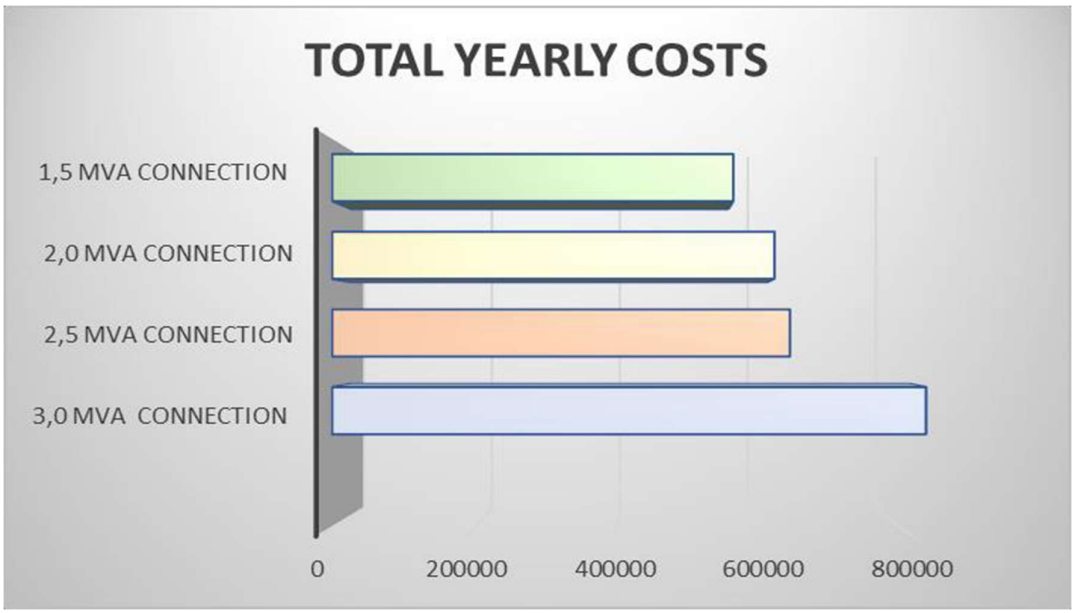
Furthermore. It is obvious that the greater the number of hours and vessels connected at an OPS system per year, the lower the costs are. Thus, implementation in big and busy ports have accelerated depreciation and financial benefits to port operators.

Past feasibility studies have shown that cold ironing is financially feasible, while key factors in the decision of implementation are; country's financial status, number and type of vessels visiting the ports and government's financial aid both in installation and in the reward program for emissions' reduction.

Results of our cases, are presented in the table and charts below, which are based on OPS calculation tool results.

Type of Vessel	OPS	TOTAL YEARLY COSTS	COST EFFECTIVENESS	
			Wind/Water/Nuclear	EU Mix
TANKER 150.000 GT	3,0 MVA CONNECTION	835.639,00 €	10,7	11,1
TANKER 80.000 GT	2,5 MVA CONNECTION	644.136,00 €	16,5	17,2
BULK CARRIER 95.000 GT	2,0 MVA CONNECTION	622.472,00 €	5,7	5,9
BULK CARRIER 45.000 GT	1,5 MVA CONNECTION	564.491,00 €	18	19,5


COST EFFECTIVENESS
20
18
16
14
12
10
8
6
4
2
0
3,0 MVA CONNECTION
2,5 MVA CONNECTION
2,0 MVA CONNECTION
1,5 MVA CONNECTION
Wind/Water/Nuclear
EU Mix


TOTAL YEARLY COSTS
1,5 MVA CONNECTION
2,0 MVA CONNECTION
2,5 MVA CONNECTION
3,0 MVA CONNECTION
0
200000
400000
600000
800000

6.3 CONCERNS

Benefits of applying cold ironing were explicitly mentioned and analyzed in current thesis. However, as all methods, it has few difficulties and gaps that should be overcome.

First of all, the total cost investment is notably high. Financial feasibility research must be conducted for each case of using cold ironing systems, to clarify if a costly investment would be profitable and environmental assisting.

Also, there is a small gap in IMO's regulations and guidelines for the use and installation of Cold Ironing. IMO could compose a project management team in order to make all needed steps, from research to development of proper guidelines and regulations.

Industry's major stakeholders are not supporting Cold ironing due to lack of proper information. Although method is widely known among big shipping companies and major shipbuilders and makers, they remain reluctant and suspicious against it. This could change by setting new and modern projects, like the Elemed, by both noted academic institutions and industry's professionals, which will present solid and sustainable feasibility studies for modern ports.

Last but not least, there are some concerns regarding the quality of power. Vessels have high-cost equipment and systems and could not afford possible failures and problems in them, which will lead to big repairs and trading delays.

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