Golar LNG ESG methodology statement

Introduction

This document outlines the definitions and the methodologies that have been used to prepare Golar LNG Environment, Social and Governance (ESG) metrics.

1. General reporting overview

Basis for reporting

The metrics and disclosures in our ESG Report are selected based on our materiality assessment, explained on our website. The metrics reported, which are included in this methodology, are:

- Greenhouse Gas (CO_2) emissions (scope 1)
- Greenhouse Gas (CO_2) emissions (scope 2)
- SO_X emissions total
- NO_X emissions total
- PM emissions total
- CH4 emissions total
- Energy consumed in MW
- FLNG emissions per ton produced
- General and Oily waste
- Employee Retention Rate (%) for Onshore staff
- Employee Retention Rate (%) for Offshore personnel
- Diversity – Number of nationalities and % of each gender onshore and offshore
- Number of marine incidents
- Lost Time Injury Frequency (LTIF)
- Total Recordable Case Frequency (TRCF)
- Number of fatalities
- Average training hours per Offshore personnel

Reporting boundary

This report focuses on the operational FLNG assets owned by Golar, as of 31 December 2024.

Emissions data will be reported for all operational FLNG assets owned by Golar during 2024. FLNG Hilli was the only FLNG operational in 2024. Emissions from our second FLNG asset, Gimi, will be reported from her commercial operations date, currently expected in Q2 2025. For the calculation of our Greenhouse Gas (CO2) emissions (scope 1), we calculate the total of our CO2e emissions from FLNG Hilli.

Health & Safety data will be reported for FLNG assets operated by Golar during 2024 (FLNG Hilli). This includes our waste and spills metrics. Data for FLNG Gimi will be included from that assets Commercial Operations Date, expected in Q2 2025.

People data will be reported for all staff employed on and offshore during 2024. This includes operational FLNGs (FLNG Hilli), pre-operational FLNGs (FLNG Gimi), office and warehouse staff.

The reporting figures referred to in the body of this report relate to the year ending 31 December 2024.

This methodology statement is reviews and updated on a yearly basis.

Standards and methodology

To facilitate comparability, most of our reporting figures are calculated based on industry-specific standards. Where industry specific standards are not available, we follow an alternative method as described in more detail below, being our view of best practice and the most accurate data available to us.

Uncertainty and estimates

Every effort is made to capture all relevant data, however where we have used estimates or assumptions, we have made this clear and this has been explicitly defined in the specific criteria for each indicator below, where appropriate.

Restatement

Where new information is available, we will restate the prior year's figures using the latest available data to make data as comparable between years as possible. We will clearly outline where restatements for specific indicators have been made.

Our responsibility

We ensure that appropriate procedures are in place to report our performance data, in all material respects, as set out in this document. We further acknowledge and fulfil our responsibilities in:

- establishing objective reporting criteria for preparing the selected information.
- the content of the Environment, Social and Governance Report.

2. Emissions reporting specifics and methodology

2.1. FLNG specifics

General overview

Our FLNG emissions are derived from the following processes: inlet gas handling, amine treating (CO2 and H2S removal), dehydration, liquefaction, heavy hydrocarbon separation, product handling, refrigeration, flash gas/fuel gas compression and utility systems.

Standards we follow

Due to the bespoke nature of Hilli, there are currently no industry standards we are able to use to calculate our emissions footprint. We have therefore performed our own studies on the various emission sources on the vessel to determine our emissions footprint and to accurately report on our emissions.

Under the GHG protocol, Golar has adopted the control approach and reports 100% of FLNG Hilli's emissions. Detailed calculation formulas, conversion factors and assumptions used for these calculations can be found in Appendix 1.

Scope and boundaries

The emissions reported are specific to our one operating asset Hilli for 2024.

Owner information: In 2024 Hilli was owned by Golar LNG, Keppel and Black and Veatch. The emissions figures reported are the total emissions for all companies (100% of the asset's emissions).

Source of emissions: Our emissions including CO2, NO2 (NO_X), SO2 (SO_X), PM and CH4 are derived and calculated from the below sources:

- Fuel combustion (including estimated methane slip)
- Flaring (fuel and refrigerant)
- Amine treating system
- Venting (refrigerant)

Equipment and fuel: The following equipment operates on fuel gas; main boilers and gas engines (with a low-pressure fuel gas stream) and the gas turbines (high pressure fuel gas stream). The main boilers (with a low-pressure fuel gas stream) are dual fuel engines that can also operate on MGO. The generators (which include both essential and emergency generators) operate on MGO. We include all equipment above in our calculations, unless otherwise stated.

Refrigerants: We use ethylene, propane and iso-pentane in our liquefaction train mixed refrigerant loops, and Freon, specifically R407C and R407F, in our air conditioning units. We include refrigerant in our calculations, unless otherwise stated.

Venting: CO2 venting occurs in our amine treating system. Freon used in air conditioning units is lost to the atmosphere through flange leaks. We include all emissions from venting in our calculations, unless otherwise stated.

Flaring: The flare system safely disposes gases to the atmosphere in situations that require evacuation of such, and otherwise could pose a risk to the plant, equipment and personnel. The gases from the independent sub systems are disposed to the atmosphere via flare stacks. We include emissions from flaring in our calculations unless otherwise stated.

Calculation, conversion factors and assumptions

The table on the next page table sets out the details behind our FLNG reporting items:

Calculation	Conversion factors and assumptions
Emission figures	
CO2e: The sum of CO2 emissions from the total fuel consumed, vented, flared and refrigerant consumed and flared multiplied by its respective conversion factors. **CO2e**= (fuel consumed x relevant CO2 conversion factor) + (venting and flaring x relevant CO2 conversion factor) + (refrigerant x relevant CO2 conversion factor) + venting of CO2 from feed gas through the amine treating system (CO2 material balance based on feed gas composition) + (freon venting x CO2e conversion factor) + (methane slip x relevant CO2e conversion factor) + (total N2O x relevant CO2e conversion factor)	**Fuel consumption:** The conversion factors used for equipment that consume gas fuel are based on direct calculation of CO2 emission based on carbon content and take into account the following for each of the different streams of gas fuels: fuel gas volume flow, fuel gas mole weight and carbon content. Our calculations are based on an assumption that we combust 100% of the carbon in the fuel. We calculate gas compositions each year based on the average fuel composition for the year. The conversion factors used for equipment that consume MGO are based on manufacturers data (main boiler) and Industry standards[1] (generators). - **Refrigerant:** The conversion factors used for ethylene, propane and iso-pentane are based on stoichiometric conversions for complete combustion. - **Venting:** The quantity of CO2 vented from freon is calculated based on material balance for the feed gas quantity and its molar concertation. Freon's conversion factor is based on the UK Government GHG Conversion Factors for Company Reporting. - **Flaring:** The conversion factors used are based on the carbon content, the flare efficiency (% carbon combusted), the gas density and CO2/C "molecular" weight ratio[2].
SOx: the sum of Sox emissions from the total fuel consumed and its sulphur content multiplied by its respective conversion factors. **SOx**= Fuel consumed x relevant Sox conversion factor from Sulphur content in fuel	- **Fuel consumption:** The conversion factors used for equipment that consume MGO are based on direct calculation based on the sulphur content in the fuel. We use the maximum sulphur content limits in MGO (specific to Cameroon) for the sulphur content with an assumed 100% combustion of the sulphur.
NOx: the sum of NOx emissions from the total fuel consumed multiplied by its respective conversion factors. **NOx**= Fuel consumed + gas flared x relevant NOx conversion factor.	- **Fuel consumption:** The conversion factors used for our equipment that operate on fuel gas, excluding main boilers, are based on manufacturers' data which also takes into account the average fuel gas parameters for the different stream types. The conversion factors used for the main boilers are based on manufacturers data which also considers the density and the Lower heating value of the fuel gas. The conversion factors used for our equipment that operates on MGO are based on manufacturers' data. For the generators we use emission data for 75% of the engine load. **Flaring:** The conversion factors used are based on manufacturing data and use the Highest Heating value.

1. Lloyds Register emission factors (Table C5)
2. CO2/C "molecular" weight ratio = One Carbon atom is giving one CO2 molecule when the gas is combusted.

Calculation	Conversion factors and assumptions
PM: the sum of PM emissions from the total fuel consumed multiplied by its respective conversion factors. **PM**= Fuel consumed + gas flared x relevant PM conversion factor.	-**Fuel consumption:** The conversion factors used for our equipment gas turbines) that operate on high pressure fuel gas are based on manufacturers data which also takes into account the average gas parameters for the fuel gas flow. The conversion factors for the gas engines & main boiler**:** are based on IMO data[3] and take into account the fuel density and the relevant PM conversion factors. The conversion factors used for our equipment that operates on MGO are based on manufacturers data, where we assume 75% engine load (generators). Whereas our conversion factors for the main boilers are based on IMO data.
CH4: the sum of CH4 emissions not combusted multiplied by its respective conversion factors. **CH4**= Methane not combusted x relevant conversion factor	The amount of methane that is not combusted through combustion engines and through flaring is based on the gas composition and manufacturers performance data. The non-combusted methane is then converted to CO2e by applying the industry standard conversion factors, which means that each tonne of non-combusted methane equals 28 tonnes of CO2.
Energy consumed in MW: The energy consumed to produce LNG is the energy of the retainage of the total gas utilised Retainage = (feed gas, MMBTU + displaced gas, MMBTU- LNG produced, MMBTU) / (feed gas, MMBTU + displaced gas, MMBTU)	(Feed gas + displaced gas) x retainage % x 0.293071 (source - https://www.inchcalculator.com/convert/million-btu-to-megawatt-hour/) Retainage shall mean the amount of LNG and/or gas (expressed in MMBTUs) that is retained by Hilli operations as compensation for any LNG or gas that is required for operation of the FLNG Facility (including for use as fuel); and/or lost or unaccounted for as a result of ordinary operational losses during operations at the FLNG Facility.
Intensity figure	
Carbon intensity (Emission per tonne produced): this indicator measures the average GHG emissions for each tonne of LNG produced.	CO2e emissions follow the same methodology as stated above, although we remove the CO2 emissions from the Amine treating systems because we do not have control over the quality (CO2 content) of feed gas received from our customer. The amine system removes this CO2 from the feed gas prior to liquefaction. The indicator is the numerator divided by the denominator, as described below. The numerator: Total CO2e excluding CO2e emission from the amine treating system. The denominator: Total tonnes of LNG produced

Data collection and quality

Vessel performance data, which includes fuel consumption, LNG exported, gas flared etc. is captured daily. The sources of the information are from flow meters and our inventory records onboard. Capturing performance data allows real-time analysis of the data. The data captured is subjected to internal reviews to validate the accuracy and completeness of the data captured. Our results also get audited by an external party on an annual basis. We have procedures documenting how we calculate our emissions figures and how we have determined the relevant conversion factors.

3. IMO data/document: MEPC 67/INF.3: REDUCTION OF GHG EMISSIONS FROM SHIPS. (Table 67).
4. IMO Calculation MEPC.1/Circ684
5. Fourth IMO GHG Study 2020

2.2 Health, Safety and Security reporting specifics and methodology

General

Golar strives to maintain an organisational culture based on openness and learning. At Golar we see failure as an opportunity to learn and we always focus on what we can learn from any failure.

Unwanted outcomes will be reported in Maximo which is our incident reporting tool. The incident will be root cause analysed and system corrective actions are implemented.

Standards and Methodology followed

For registration of incidents, we follow OCIMFs definitions, and we use the DNV MSCAT model for root cause analysis of any registered incident. For incidents with serious potential, we also do a more thorough investigation based on the Kevin Top-Set methodology.

Scope and boundaries

We register all incidents that happen from the point where an employee enters the workplace until they leave the workplace. For the purposes of our ESG metrics, the workplace is a FLNG, and we count 24 exposure hours per day.

We differentiate between leisure time and worktime incidents. The reason is that we allow for higher risk exposure during leisure time than during work hours. Playing basketball or exercising in the gym will always involve a certain risk for smaller injuries like a twisted ankle or similar.

However, we consider the benefits of physical activity to be greater than the disadvantage related to a small number of RWCs caused by work out and physical activity.

H&S data has been reported for the period we operated the FLNG (Hilli) in 2024, apart from training hours which covers *both* FLNG's (Hilli and Gimi).

Calculation, conversion factors and assumptions

The below table sets out the details behind our reporting items:

Calculation	Conversion factors and assumptions
Number of marine incidents	A marine incident means an event which has occurred directly in connection with the operations of a vessel that endangered, or, if not corrected, would endanger the safety of the vessel, its occupants or any other person or the environment. However, it does not include deliberate acts or omissions intended to cause harm to the safety of a ship, an individual, or the environment Standard used: IMO (RESOLUTION MSC.255(84)).
Number of fatalities	A death directly resulting from a work injury regardless of the length of time between the injury and death.
Lost Time Injury Frequency (LTIF)	The number of lost time injuries that occurred during the reporting period calculated per 1-million-man hours worked. This is calculated as follows: LTIF = LTIs* x (1,000,000/ Exposure Hours) *LTI: Lost Time Injuries are the sum of: • **Fatalities:** A death directly resulting from a work injury regardless of the length of time between the injury and death • **Permanent Total Disabilities (PTD):** any work injury which incapacitates an employee permanently and results in termination of employment on medical grounds (e.g. loss of limb(s), permanent brain damage, loss of sight) and precludes the individual from working either at sea or ashore.
	• **Permanent Partial Disabilities (PPD):** Permanent Partial Disability is any work injury which results in the complete loss, or permanent loss of use, of any member or part of the body, or any impairment of functions of parts of the body, regardless of any pre-existing disability of the injured member or impaired body function, that partially restricts or limits an employee’s basis to work on a permanent basis at sea. Such an individual could be employed ashore but not at sea in line with industry guidelines. • **Lost Workday Cases (LWC):** This is an injury which results in an individual being unable to carry out any of their duties or to return to work on a scheduled work shift on the day following the injury unless caused by delays in getting medical treatment ashore.
Total Recordable Case Frequency (TRCF)	The number of total recordable cases per million exposure hours worked during the period. This is calculated as follows: TRCF = (LTIs + RWCs + MTCs) * x (1,000,000 / Exposure Hours)

	***RWC:** Restricted Work Cases - An injury which results in an individual being unable to perform all normally assigned work functions during a scheduled work shift or being assigned to another job on a temporary or permanent basis on the day following the injury. ***MTC:** Medical Treatment Case - Any work-related loss of consciousness (unless due to ill health), injury or illness requiring more than first aid treatment by a physician, dentist, surgeon or registered medical personnel, e.g. nurse or paramedic under the standing orders of a physician, or under the specific order of a physician or if at sea with no physician on-board could be considered as being in the province of a physician.
Number of hours per offshore personnel spent on training, towards safe and efficient operations, in the year	The average number of hours for Hilli and Gimi Offshore personnel spent on training, towards safe and efficient operations, in the year, divided by the total number of offshore personnel by the end year. Safety training is the sum of the following training: • **Company trainings (including BOSIET):** This is classroom or web-based safety training by either internal or external providers. Golar run about 40 such courses every year. • **E-learning courses:** Golar subscribe to e-learning courses from the company 'Seagull'. All are included in the calculations. • **On board safety drills:** the number of weekly safety training drills each seafarer/worker has attended during their stay onboard. Normally 50 minutes per week. • **STCW:** Mandatory safety training for seafarers to maintain proficiency certificates. Training is provided by accredited training centres.

Data collection and quality

Safety, security and environment related incidents are reported, and root cause analysed in our Maximo application. Maximo reports are quality checked by the senior officers onboard and the onshore support team.

Exposure hours are collected from our personnel system OCS and number of incidents are collected from Maximo. The results are displayed in our BI system PowerBi.

3. Waste reporting specifics and methodology

General

Waste reporting is based on what is being generated onboard our operational FLNG Hilli. Waste generated by our offices is not included in this report as this is considered immaterial.

Standards and Methodology followed

The Company has established an Environmental Management System (EMS) in compliance with the ISO 14001:2015 Standard. The ESG reporting of waste is based on our existing, and approved, environmental practices in line with this standard.

Scope and boundaries (Waste as Environmental Aspect Identification)

Environmental Aspect Elements are the organisation's footprints that can impact the environment. Environmental Aspects are identified in workshop sessions and the outcome is the Golar Environmental Aspect Register. Waste is an Environmental Aspect Element that is reported and monitored as part of the ESG KPIs.

Waste data has been reported for Hilli for 2024. There were no environmental fines in 2024.

Calculation, conversion factors and assumptions

The below table sets out the details behind our reporting items:

Calculation	Conversion factors and assumptions
FLNG general waste: Amount of garbage discharged to sea, incinerated and disposed ashore	Unit: m^3 **Definition:** Amount of garbage discharged to sea, incinerated and disposed ashore, by garbage type (in accordance with MARPOL Annex V garbage types). **Data source and calculation:** Figures should be extracted from the Garbage Record Book (GRB) for the period. Cooking oil disposed should be extracted from the Oil Record Book (ORB). Figures should match the figures entered in the GRB/ORB and the waste receipts from the garbage disposal contractor. Figures for garbage discharged to sea and incinerated are expected to be zero (it is not permitted to discharge garbage to sea except in emergencies, and onboard incinerators have been decommissioned).
Calculation	**Conversion factors and assumptions**
FLNG oily waste	**Bilge water pumped through OWS, Disposed Ashore, Evaporated and Incinerated:** Unit: m^3 **Definition:** Bilgewater collected in bilge holding tank. Does not include rainwater run-off. **Data source and calculation:** Figures should be extracted from the Oil Record Book for the period. For reference, volumes pumped through the oily water separator (OWS) are read from the OWS control panel at every discharge. Volumes disposed ashore are calculated manually from electronic tank level readings. Bilgewater evaporated / incinerated is expected to be zero (there is no evaporator on the bilge system and onboard incinerators have been decommissioned). Bilge disposed ashore should normally be zero, except when failure/ repair of bilge system requires onshore disposal.

	Waste Oils not processed through the bilge or sludge holding tank are not currently reported on as these numbers are only held in the oil record book onboard. **Sludge pumped through OWS, Disposed Ashore, Evaporated and Incinerated:** Unit: m^3 **Definition:** Sludge collected in sludge holding tank. **Data source and calculation:** Figures should be extracted from the Oil Record Book for the period. For reference, sludge separation water is pumped through OWS – volumes are read from the OWS control panel at every discharge. The remaining sludge is pumped onshore via a supply vessel – the volume is calculated manually from electronic tank level readings. Sludge evaporated /incinerated is expected to be zero (there is no evaporator on the sludge system and onboard incinerators have been decommissioned)

Data collection and quality

All vessels are ISO 14001 certified to ensure compliance with relevant regulations and consistent management of environmental improvements.

The actual figures are reported monthly in dedicated web-based software.

Each vessel ’s general waste discharge to shore is quality checked by the office including proper segregation and quantity. For the latter we use photos and “Advance Notification of Delivery of Waste” Golar HSE 3405 forms.

The HSE 3405 form quantities are checked against the receipt from the local collecting facility.

Garbage is stated on the PSV cargo manifest and MARPOL Certificates are then received from the waste management service provider.

In case of any environmental quarterly KPI breach, vessels are instructed to raise a non-conformity that is analysed for causes - remedials and re-occurrence prevention, fleetwide.

Golar’s Power BI system is used to analyse the KPI’s during the quarterly Operations Committee Meetings.

After the meeting, the quarterly Operations Committee Meeting minutes are shared with the fleet for their info/guidance.

At the end of quarter four, the Operations Committee issues a new “Company Environmental Program”, based on the last years achievements, which is shared with the fleet.

4. People reporting specifics and methodology

General

Our people are our greatest asset. We are proud to have 31 different nationalities working for us offshore and 26 onshore.

Standards and Methodology followed

We use the Intertanko model and formula for calculating retention rate. This is an acknowledged standard in the maritime industry.

Scope and boundaries

Our offshore metrics are specific to Hilli and Gimi only.

Calculation, conversion factors and assumptions

The below table sets out the details behind our reporting items:

Calculation	Conversion factors and assumptions
People and Community	
Number of office staff employed as at 31 December 2024	Number of permanent employees, temporary employees and consultants “registered” in Simployer as at 31 December of the reporting year.
Number of offshore staff employed as at 31 December 2024 (Hilli and Gimi)	Number of employees with activity registered in OCS during the reporting year. “Activity” can be onboard, training, leave etc.
Employee Retention Rate (%) for Office staff	Proportion of year end work force comprised of employees present at the start of the year: (# employees present as at 1 January of the reporting year who remained employed as at 31 December of the reporting year / # of employees as at 1 January 2024) x 100. This is specific to permanent employees.
Employee Retention Rate (%) for Offshore personnel (Hilli and Gimi)	Intertanko model for calculation of Retention: $\textbf{\% Retention Rate (RR)} = 100 - \left[\frac{\{S - (UT + BT)\} \times 100}{AE} \right]$ **Where:** **RR** = Retention rate 24 months (in line with TMSA best practice guidance). **S** = Total number of terminations for whatever cause UT+BT= Unavoidable Terminations (retirements and long-term illness) and Beneficial Terminations (ex: redundancies, under-performers). **AE** = The average number of employees working for the company during the same period as calculated, this should be any period of 12 months.
Calculation	**Conversion factors and assumptions**

Diversity - Number of nationalities and % of each gender onshore/offshore (Hilli and Gimi)	**Gender:** Divided the number of females/males as at 31 December of the reporting year by the total number of onshore/offshore employees at Golar as at 31 December of the reporting year. Gender data used in the calculation was confirmed by all employees and was extracted from Simployer/OCS. **Nationalities:** Sum of the total number of nationalities recorded in employee profiles in Simployer/OCS.
Board attendance %	(The total number of attendees recorded in the minutes of each board meeting during the reporting year divided by the total number of board members multiplied by the total number of board meetings) x 100

Data collection and quality

For onshore staff, we use a common personnel system called Simployer for the Golar Group. Joiners and leavers are entered with start and leave dates. The turnover/retention calculation is based on these start and leaver dates as well as tagging of people not to be included in the calculation.

We use a Crew Management System (OCS) for offshore personnel where all data connected to hiring and leaving is entered. The same system is also used to register the various certificates and training needed to fulfil the requirement given in the STCW and the ISM Code.

4. Greenhouse Gas (CO2) emissions (scope 2)

Data collection and quality

Our Scope 2 emissions are calculated following the GHG Protocol and relate to our leased office spaces. For each office we either obtained our energy usage from our electricity supplier or made a best estimate based on other information provided.

London and Oslo – These are our main offices, both of which were leased for a full year. All energy usage for both is included.

Bermuda – This is a small office that we also leased for a full year. All energy usage is included.

Cameroon – This is also a very small office. As with 2023, the Base Manager of our Cameroonian office was unable to provide an estimate of energy usage for the office, providing only actual energy consumed by our refrigerated containers. As a best estimate we have therefore taken the estimate for last year's office consumption and added it to this year's actual reefer container consumption.

For our London office we were able to obtain a renewable energy certificate, as all energy purchased for our London office is supplied from renewables. Therefore, under the GHG protocol we are required to calculate our Scope 2 emissions under both the location and market- based methods.

Under the location-based method, for each office we multiplied our energy usage by emission factors available from the local government or the IEA.

For the market-based method, the only market specific information we were able to obtain was for our London office, as described above. All other office emissions were calculated under the location-based method.

Appendix 1

FLNG

General overview

Our FLNG emissions are derived from the following processes: inlet gas handling, amine treating (CO_2 and H_2S removal), dehydration, liquefaction, heavy hydrocarbon separation, product handling, refrigeration, flash gas/fuel gas compression and utility systems.

Scope and boundaries:

Source of emissions: Therefore, our emissions including, CO_2, NOx, SOx and PM are derived and calculated from the below sources:

- Fuel combustion (including methane slip)
- Flaring (fuel and refrigerant)
- Amine treating system
- Venting (Refrigerant)

Equipment and fuel: The following equipment operates on fuel gas; Main Boilers and Gas Engines (with a low-pressure fuel gas stream) and the Gas turbines (high pressure fuel gas stream). The Main Boilers (with a low-pressure fuel gas stream) are dual fuel engines that can also operate on MGO. The Generators (which include both essential, emergency generators and fire water pumps operates on MGO. We include all the equipment above in our calculations, unless otherwise stated.

Refrigerants: We use Ethylene, Propane, Iso-pentane in our mixed Refrigerant loops in our liquefaction trains. Freon, specifically R407C and R407F, in our air conditioning units. We include refrigerant in our calculations, unless otherwise stated.

Venting: CO_2 venting occurs in our Amine Treating System. Freon used in air conditioning units is lost to atmosphere through flange leaks. We include all emissions from venting in our calculations, unless otherwise stated.

Flaring: The flare system safely disposes gases to the atmosphere in situations that will require evacuation of such, and otherwise could pose a risk to the plant, equipment, and personnel. The gases from the independent sub systems are disposed to the atmosphere via flare stacks. We include emissions from Flaring in our calculations unless otherwise stated.

Calculation, conversion factors and assumptions

The below table sets out the details behind our FLNG reporting items:

Calculation	Conversion factors and assumptions
CO2e: The sum of CO_2 emissions from the total fuel	**Fuel consumption:** The conversion factors used for equipment that consume gas fuel are based on direct calculation of CO_2 emission

consumed, vented, flared and refrigerant consumed and flared multiplied by its respective conversion factors. **CO2e=** (Fuel consumed x relevant CO2 conversion factor) + (Venting and flaring x relevant CO2 conversion factor) + (Refrigerant x relevant CO2 conversion factor) + Venting of CO2 from feed gas through Amine treating system (CO2 material balance based on feed gas composition) + (Freon venting x CO2e conversion factor) + (methane slip x relevant CO2e conversion factor) + (total N2O x relevant Co2e conversion factors)	based on carbon content and took into account the following for each of the different streams of gas fuels; Fuel gas volume flow, fuel gas mole weight, Carbon content. Our calculations are based on an assumption that we combust 100% of the carbon in the fuel. We calculate gas compositions each year based on the average fuel composition for the year. The conversion factors used for equipment that consume MGO are based on manufacturers data (main boiler) and Industry standards[1] (Generators). **Refrigerant:** The conversion factors used for Ethylene, Propane and Iso-pentane are based on stoichiometric conversions factor for complete combustion. **Venting:** The quantity Co2 vented from Freon, is calculated based on material balance for the feed gas quantity and its molar concertation. Freon's conversion factors is based on the UK Government GHG Conversion Factors for Company Reporting. **Flaring:** The conversion factors used are based on the carbon content, the flare efficiency (% carbon combusted), the gas density and CO2/C "molecular" weight ratio[2].
SOx: the sum of Sox emissions from the total fuel consumed and its sulphur content multiplied by its respective conversion factors. **SOx=** Fuel consumed x relevant Sox conversion factor from Sulphur content in fuel	**Fuel consumption:** The conversion factors used for equipment that consume MGO are based on direct calculation based on the sulphur content in the fuel. We use the maximum sulphur content limits in MGO (Specific to Cameroon) for the sulphur content with an assumed 100% combustion of the sulphur.
NOx: the sum of NOx emissions from the total fuel consumed multiplied by its respective conversion factors. **NOx=** Fuel consumed + gas flared x relevant NOx conversion factor.	**Fuel consumption:** The conversion factors used for our equipment that operates on fuel gas, excluding Main boilers, are based on manufacturers data which also takes into account the average fuel gas parameters for the different stream types. The Conversion factors used for the Main boilers are based on manufacturers data which also takes into account the density and the Lower heating value of the fuel gas. The conversion factors used for our equipment that operates on MGO are based on manufacturers data. For the Generators we use emission data for 75% engine load. **Flaring:** The CF used are based on manufacturing data and uses the Highest Heating value.
PM: the sum of PM emissions from the total fuel consumed multiplied by its respective conversion factors.	**Fuel consumption:** The conversion factors used for our equipment (Gas turbines) that operates on high pressure fuel gas are based on manufacturers data which also takes into account the average gas parameters for the fuel gas flow. The CF for the Gas engines & Main

1 Lloyds Register emission factors (Table C5)

2 CO2/C "molecular" weight ratio = One Carbon atom is giving one CO2 molecule when the gas is combusted.

PM= Fuel consumed + gas flared x relevant PM conversion factor.	boiler**:** are based on IMO data[3] and takes into account the fuel density and the relevant PM conversion factors. The conversion factors used for our equipment that operates on MGO (Marine Gas Oil) are based on manufacturers data, where we assume 75% engine load (Generators). Where our CF for the Main are based on IMO data. **Flaring:** The CF used are based on manufacturing data and uses the Higher Heating value (HHV).
Carbon intensity (Emission per tonne produced): this indicator measures the average GHG emissions for each tonne LNG produced. The indicator takes into account: The numerator: Total CO2e excluding CO2e emission from Amine treating system. The Denominator: Total tonnes LNG produced	CO2e emissions follow the same methodology as stated above, although we remove the CO2 emissions from the Amine treating systems because we do not have control over the quality (CO2 content) of feed gas received from our customer. The amine system removes this CO2 from the feed gas prior to liquefaction.

Retainage:

Retainage shall mean the amount of LNG and/or Gas (expressed in MMBTUs) that is retained by Hilli operations as compensation for any LNG or Gas that is required for operation of the FLNG Facility (including for use as fuel); and/or lost or unaccounted for as a result of ordinary operational losses during operations at the FLNG Facility.

Retainage: (Feed Gas, MMBTU + Displaced Gas, MMBTU - LNG Produced, MMBTU) / (Feed Gas, MMBTU + Displaced Gas, MMBTU)

Collecting quality data:

Vessel performance data, which includes fuel consumption, exported LNG, gas flared etc. are captured daily. The sources of the information are from flow meters and our inventory records on board. Capturing performance data allows real-time analysis of the data. The data captured is subjected to internal reviews to validate the accuracy and completeness of the data captured. Our internal processes also get audited by an external party on a regular basis throughout the year.

We have robust procedures documenting how we calculate our emissions figures and how we have gotten to our conversion factors. Our procedure has been audited by external parties.

3 IMO data/document: MEPC 67/INF.3: REDUCTION OF GHG EMISSIONS FROM SHIPS. (Table 67).

CONVERSION FACTORS:

Conversion factors applied for Refrigerants:

Ethylene, Propane and Iso-pentane are imported refrigerants used in each Mixed Refrigerant loops of natural gas liquefaction trains. Refrigerants lost in Mixed refrigerant loops are combusted in flare system.

Following combustion CO_2 conversion factors are used for each refrigerant:

- Ethylene: 3.138
- Propane: 2.994
- Isopentane: 3.050

Freon (R407C, R407F) are used to cool all the airconditioned rooms on the unit as well as the provision cold rooms. Freon is used in the accommodation block, Engine control room, all local equipment rooms (LER's) in port and starboard sponsons as well as the bow area and in the 45- and 12-ton crane cabins. Freon is mainly lost to atmosphere through flange leaks. Following CO_2e factor used freon leaks (Ref: https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019):

- R407C: 1624
- R407F: 1674

Calculation of CO_2 from venting through Amine Treating System:

The Amine Treating System on Hilli is designed to remove up to 3 mol% CO_2 from the feed gas stream for all 4 liquefaction trains at full feed gas capacity to 50ppmv. During 2024, CO_2 content in the feed gas is about 0.44 mol% and only 2 trains are running at full capacity with intermittent running of a 3rd train. Since CO_2 in the feed gas is much lower than CO_2 removal capacity of the Amine treating unit, 96% CO_2 removal and venting is considered in the calculations.

Conversion factors applied for combustion:

CO, CH_4, NOX and PM emissions from the gas combustion through operation of the Main Boilers, Gas Engines, Gas Turbines and the Flare onboard are derived from Fuel gas consumption with average gas compositions from December 2020, which then are calculated with specific conversion factors from either manufacturers data or IMO recommended conversions.

The CO_2 emissions are calculated directly based on carbon content in the fuel gas.

CF x Sm3 Gas Fuel = kg Pollutant emission

The CO_2e derived from non-combusted CH_4 and N_2O emissions apply the following conversion factors;

- CH_4 CO_2e: CH_4kg Non combusted x 25 = Kg CH_4 CO_2e
- N20 CO_2e: Fuel gas SCF /35.3147 *0.749 (standard density kg/SM^3) / 1000 (tonnes) x 1.19161 (kg CO_2e of N_2O per tonnes) = Kg N_2O CO_2e
- N20 CO_2e: MGO (tonnes) x 38.40721(kg CO_2e of N_2O per tonnes) = Kg N_2O CO_2e

(sources - https://climatechangeconnection.org/emissions/co2-equivalents/

https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2024)

CO_2, CO, NOx and PM emissions from the MGO combustion through operation of the Main Boilers, Essential and Emergency Generators and Fire Water pumps on MGO are derived from Fuel consumption (Marine Gas Oil (MGO), which then are calculated with specific conversion factors from either manufacturers data or IMO recommended conversions. The SOx emission from combustion of MGO is calculated directly based on the Sulphur weight content in the MGO (% S w/w).

CF x tonne MGO = kg Pollutant emitted

Direct calculation of CO_2 emission from combustion of gas based on fuel Carbon Content:

The CO_2 emission from combustion of gas can be calculated directly when the Carbon content (kg C / kg fuel) for the fuel gas is known.
For each Carbon atom (atom weight =12) a CO_2 molecule (mole weight = 44) is formed. Assuming 100% combustion of the carbon in the fuel:

Weight (kg) of gas x Carbon content x 44/12 = Weight (kg) of CO_2 emitted

Weight(kg) of gas = Volume of gas (Sm3) * Density (kg/Sm3)
A mole of a (ideal) gas has a specific Molar volume = 23.645 m3 at 288.15 °K, 101.3 kPa (Standard Condition)
We may substitute: Density fuel gas (kg/Sm3) = (1/23.645) x Fuel gas mole weight (kg/kmole)

Volume of gas (Sm3) x (1 / 23.645) x Fuel gas mole weight x Carbon content x 44/12 = Weight(kg) of CO_2

CO_2 Conversion Factor based on gas Carbon content:

CF (CO_2) = (1/Molar volume) x fuel mole weight x Carbon content x 44/12

The below table summarises the direct calculation of the CO_2 conversion factors for the gas fired consumers on the FLNG.

GT CO2 Conversion factor (Based on Fuel gas Carbon Content)					
Equipment	CF Calculation (Note)	Conversion F.	CF Units		
Gas Turbines (HP Fuel gas)	(1/23.645) `* 17.836 * 0.75 * 44/12	2.074	kg/Sm3 of fuel	Molar weight	17.836 kg/mole
Gas Engines (LP Fuel gas)	(1/23.645) `* 17.388 * 0.62 * 44/12	1.672	kg/Sm3 of fuel	Molar weight	17.388 kg/mole
Main Boilers (LP Fuel gas)	(1/23.645) `* 17.388 * 0.62 * 44/12	1.672	kg/Sm3 of fuel	Molar weight	17.388 kg/mole
Flaring (LP Fuel gas)	0.735 * 0.98 * 0.62 *44/12	1.637	kg/Sm3 of fuel	Density LP fuel	0.735 (kg/Sm3)

Notes:

- The calculated gas fuel CO_2 conversion factors (CFs) are assuming 100% combustion of the fuel gas, except for Flaring – where 98% efficiency is applied.
- The specific molar volume at reference standard conditions (temperature 15 °C, pressure 101.3 kPa) is 23.645 m3 / kmole.
- HP gas fuel, Molar weight g/mole = 17.836
- HP gas fuel, Carbon Content = 75%
- LP gas fuel, Molar weight g/mole = 17.388
- LP gas fuel, Carbon Content = 62%
- The ratio 44/12 equals kg CO_2 created per kg C combusted

We have two different streams of gas fuel:

- High pressure fuel gas (HP Fuel gas): Gas Turbines
- Low pressure fuel gas (LP Fuel gas): Main Boilers, Gas Engines, flaring

Gas Turbines (HP fuel gas)

Direct calculation of CO_2 Conversion Factor based on carbon content, for combustion of HP fuel gas, (100% Carbon combustion):

CF = (1/23.645) x 17.836 x 0.75 x 44/12 = 2.074 kg/Sm3 HP fuel gas

- HP gas fuel, Molar weight g/mole = 17.836
- HP gas fuel, Carbon Content = 75%

The conversion factors for Pollutant emissions from the Gas Turbine (GT) manufacturer's standard fuel gas calculation have been converted for the properties (LHV and mol weight) of the HP Fuel gas composition.

Conversion Factors - Pollutant emission reporting for GTs		
Pollutant	**Unit**	**CF**
NOx (NO2) emissions	**kg/Sm3 fuel**	0.00153
CO emissions	**kg/Sm3 fuel**	0.00093
UHC (CH4) emissions	**kg/Sm3 fuel**	0.00033
VOC emissions	**kg/Sm3 fuel**	0.00012
PM10 emissions	**kg/Sm3 fuel**	0.00021

GT (HP) Fuel gas data:

Dec-20		
HP Fuel Gas		Unit
Standard Density	0.75	kg/Sm3
Normal Density	0.80	kg/Nm3
HHV (Composition Feed Gas Dec. 2020)	1083.4	BTU/scf
HHV Conversion	53322	kJ/kg
LHV est. from HHV: LHV= HHV/1.108	48125	kJ/kg
Mole weight	17.84	kg/kmole

Gas Engines (LP fuel gas)

The CO2 Conversion Factor for the LP fuel gas combustion calculated directly based on carbon content (100% Carbon combustion):

CF = (1/23.645) x 17.388 x 0.62 x 44/12 = 1.672 kg CO2/Sm3 LP fuel gas

- LP gas fuel, Molar weight g/mole = 17.388
- LP gas fuel, Carbon Content = 62%

The conversion factors for pollutant gases received from the Gas Engine manufacturer (RR) have been converted for the Dec. 2020 average LP fuel gas parameters.

CFs to use for Hilli LP gas fuel:	(LHV) 30500 kJ/Sm3			
RR Gas Engine 85% Load	**Pollutants**			
	Unit	NOx	CO	CH4
Pollutant CF	g/kJ	0.00016	0.00018	0.00051
Hilli LP Fuel	kJ/Sm3 (LHV)	30500	30500	30500
Pollutant CF	kg/Sm3	0.00487	0.00555	0.0154581
Pollutant Conversion Factor	**kg/Sm3**	**0.005**	**0.006**	**0.0016**

For NMVOC on the Gas Engines, there is no manufacturer data available.

A NMVOC Conversion factor of CF = 0.00018 kg VOC / Sm3 LP Fuel gas is based on USEPA AP-42 3.2 Natural Gas-fired Reciprocating Engines. This has an average Emission Factor (quality) Rating (E).

An PM10 (Particles) Conversion factor of 0,00018 g PM10/g fuel gas is found in IMO document MEPC 67/INF.3: REDUCTION OF GHG EMISSIONS FROM SHIPS. (Table 67).

Measured in units of kg/Sm3 fuel gas, the PM10 CF becomes:

The LP fuel has density (kg/Sm3) =	0.74	(Dec. 2020 LP fuel gas))
PM emission Conversion Factor :	0.00018	kg PM10/kg LP fuel gas
PM emission Conversion Factor :	**0.000133**	kg PM10/Sm3 LP fuel gas

Main Boiler (LP fuel gas)

The direct calculation of CO2 Conversion Factor (CF) based on LP fuel gas Carbon content (100% Carbon combustion) gives:

CF = (1/23.645) x 17.388 x 0.62 x 44/12 = 1.672 kg/Sm3 LP fuel gas

- LP gas fuel, Molar weight kg/kmole = 17.388
- LP gas fuel, Carbon Content = 62%

The Pollutants conversion factors received from the Hamworthy Boilers have been converted to reflect the density (kg/Sm3) and the LHV for the LP Fuel gas (December 2020):

Main Boiler on LP Fuel Gas - CFs			Conversion Factor
Pollutant / GHG gas	Lean Natural Gas Conv. Factors	Lean Nat. Gas Conv. Factors	LP fuel gas LHV convert.
	kg/tonne of Gas	kg/Sm3	kg/Sm3
CO	0.733	0.00054	**0.0007**
CO2	1880.5	1.38781	**1.6723**
CH4	0.008	0.000006	**0.000007**
NOx (as NO2)	3.011	0.00222	**0.0027**
SO2		0.00000	**0**
Non Meth VOC	0.041	0.00003	**0.000036**
LP fuel Density		0.74	
LHV fuel corr.			1.205

The CO2 emission of 1.6723 kg/Sm3 LP fuel gas for 100% combustion of LP fuel has been directly calculated based on carbon content (62%). The ratio between LP fuel LHV and "Lean Natural Gas" LHV is taken as equal to: 1.6723 /1.38781 = 1.205, and applied to convert the Hamworthy pollutant Lean Natural Gas CF values to the LP fuel gas LHV level.

The PM10 (Particles) Conversion factor of 0,000133 kg PM10 / Sm3 LP fuel gas is based on IMO document MEPC 67/INF.3: REDUCTION OF GHG EMISSIONS FROM SHIPS. (Table 67). (See above Gas Engine PM10 for conversion from g PM10/g fuel gas to kg PM10/ Sm3 fuel gas.)

Flaring

The Greenhouse gas CO2 Conversion Factor is calculated directly based on LH fuel gas carbon content and 98% flare efficiency (% carbon combusted):

CO2 CF = Density gas (kg/Sm3) x Flare efficiency x fuel gas Carbon Content x 44/12 = kg CO2 / Sm3 LP fuel gas

CO2 CF = 0.735 x 0.98 x 0.62 x 44/12 = **1.637** kg CO2/Sm3 LP fuel gas

- LP gas fuel, Density kg/Sm3 = 0.735
- LP gas fuel, Carbon Content = 62%
- Flare efficiency = 98% (% fuel Carbon combustion)

The conversion factors received from ZEECO, the manufacturer of the Flare Tips, have been used for CO, CH4, NOx (as NO2) and Non-Methane VOC emissions. See Table below.

Flare Emissions - (LP fuel gas - HHV= 915.33 BTU/SCF)				
	Zeeco's Conv. factor	Zeeco's Conv. factor	LP Fuel gas HHV= 915.33 BTU/SCF Conv. Factor	LP Fuel gas HHV= 915.33 BTU/SCF Conv. Factor
Pollutant	lb/MMBTU	kg/MMBTU	kg/SCF	kg/Sm3
CO	0.31	0.14061	0.000129	0.00455
CH4	0.14	0.06350	0.000058	0.00205
NOx (as N02)	0.068	0.03084	0.000028	0.00100
(NM)VOC	0.57	0.25855	0.000237	0.00836
PM10	0.0325	0.01474	0.000013	0.00048

Conversion factors for CO, CH4, NOX, SOX and PM emissions from combustion of MGO:

Main Boilers fired on MGO fuel

The below table of conversion factors received from Hamworthy Boilers has been used for Main boilers on MGO fuel for CO2 and the pollutants CO, NOx (as NO2), and Non-Methane VOC.

Main Boiler - MGO Fuel	
Pollutants	Conversion Factor
	kg/tonne MGO
CO	0.85
CO2	3120.3
CH4	0
Nox (as NO2)	6.982
SO2	30
Non Meth VOC	0.047

Direct calculation of SO2 based on sulphur w/w content in fuel:

Based on early info. of “max Sulphur limit": " 0.37 % (wt.) in the MGO available in Cameroon”, this Sulphur content became the MGO Sulphur content used in the initial direct SO2 calculations.

Hilli “Bunker Notes”:
Marine Gas Oil is the alternative fuel to LP process gas for the main Boilers (and the only fuel for the Essential and Emergency Diesel Generators.)
The highest Max. Sulphur limit seen referred to in bunker notes for delivered MGO is 0.35%wt.
Actual Sulphur content stated in Bunker notes for the MGO has been from below 0.1% to 0.3%w/w.

Golar will maintain the assumption of 0.37% w/w Sulphur in the MGO as a conservative value for the direct SO2 calculations of SOx (SO2) emissions until an eventual new upper limit for the Sulphur w/w content has been documented.

Molecular weights: S = 32.065; SO2 = 64.066 (kg/kmole)
MDO Sulphur Content: 0.37% S (w/w)

Calculation of Sulphur CF for MGO:
Fuel in tonne x 0.0037 x 64.066/ 32.065 = Emissions SO2 in kg
<u>CF = 7.39 kg SO2/tonne MGO</u>

<u>The PM10 (Particles) Conversion factor of 0,97</u> <u>kg PM10 / Tonne MGO</u> is taken from IMO document MEPC 67/INF.3: REDUCTION OF GHG EMISSIONS FROM SHIPS. (Table 67):

Table 67: PM emission factors (g/g fuel).

Region	Fuel type	year		
		2012	2030	2050
Global	HFO	0.00728	0.00728	0.00728
	LSFO	0.00426	0.00426	0.00426
	MGO	0.00097	0.00097	0.00097
	LNG	0.00018	0.00018	0.00018

Essential and Emergency Diesel Generator (MGO fuel)

The conversion factors for pollutants CO, NOx, Total HC and Particular matter (PM10) are calculated based on manufacturer's (Caterpillar) Performance Data sheets and Emission Data sheets.

Essential & Emergeny Diesel Generators - Diesel Fuel (MDO)						
	Pollutant	**NOx**	**NOx**	**CO**	**Total HC**	**PM10**
% Load		100%	75%	75%	75%	75%
Brake Engine Power (BKW)	BKW	2351.0	1763.0	1763.0	1763.0	1763.0
Brake Spec. Fuel Cons. (BSPC)	G/BKW	200.3	203.1	203.1	203.1	203.1
Fuel Consumption	G/HR	470905.3	358065.3	358065.3	358065.3	358065.3
Pollutant Emission	G/HR	18053.0	12593.0	2218.0	497.0	166.7
g Pollutant/ g Fuel	g /g	0.03834	0.03517	0.00619	0.00139	0.00047
Kg Pollutant / tonne Fuel	**kg /tonne**	**38.34**	**35.17**	**6.19**	**1.39**	**0.47**

The Performance and Emissions Data for 75% Engine load has been used. (The NOx Emissions at 100% load is included for info). The 75% load data is closest to the actual operational mean load, expected to be at about 85%.

For Diesel engines, being subjected to a high focus on NOx emissions, it may be discussed whether one should always apply the 100% load NOx data in order to be conservative.
For the other pollutants the 75% load emission CFs are higher than they are at 100% load.

The conversion factor for SO2 is calculated directly based on MGO Sulphur content. See above for identical calculation for MGO (0.37% C) under Main Boiler (MGO fuel). CF = 7.39 kg SO2/tonne MGO consumed.

The Diesel engine MGO conversion factor for CO2 emission:
We are using the industry standard, Lloyds Register Engineering Services emission database, of 3170 kg CO2 per tonne of fuel (MGO) consumed. (Table C5 Lloyds Register emission factors in g/kwh (660) and kg /tonne (3170)

Reference:
https://ec.europa.eu/environment/archives/air/pdf/chapter3_end_ship_emissions.pdf
(Table C5 Lloyds Register emission factors in g/kwh (660) and kg /tonne (3170)

Summary Table Conversion Factors

Emissions from MGO Consumption										
Emissions Source	MGO Consump	Conversion Factors								Calculation
		CO	CO2	CH4	NO2 (NOX)	SO2 (SOX)	(NM)VOC	PM10		
Main Boilers	Tonnes	0,85	3120,3	0	6,982	7,39	0,047	0,97	kg/tonne of fu	Value from Apex in tonnes * CF = emissions in kg
Essential & Emergency Generators	Tonnes	6,19	3170	0	35,17	7,39	1,39	0,47	kg/tonne of fu	Value from Apex in tonnes * CF = emissions in kg
Fire Water Pumps	Tonnes	5,88	3170,00	0,00	38,66	7,39	1,39	0,47	kg/tonne of fu	Value from Apex in tonnes * CF = emissions in kg
Emissions from Natural Gas Consumption										
Emissions Source	Natural Gas Co	Conversion Factors							CF Units	Calculation
		CO	CO2	CH4	NO2 (NOX)	SO2 (SOX)	(NM)VOC	PM10		
Gas Turbines (HP Fuel)	SCF	0,00093	2,074	0,00033	0,00153	0	0,00012	0,00021	kg/Sm3 of fue	Value in Apex in SCFs / 35.3147 * CF = emissions in kg
Gas Engines (LP Fuel)	SCF	0,006	1,672	0,0016	0,005	0	0,0018	0,000137	kg/Sm3 of fue	Value in Apex in SCFs / 35.3147 * CF = emissions in kg
Main Boliers (LP Fuel)	SCF	0,0007	1,672	0,000007	0,0027	0	0,000037	0,000133	kg/Sm3 of fue	Value in Apex in SCFs / 35.3147 * CF = emissions in kg
Flaring (LP Fuel)	SCF	0,00455	1,637	0,00205	0,001	0	0,00836	0,000048	kg/Sm3 of fue	Value in Apex in SCFs / 35.3147 * CF = emissions in kg

Fuel Gas

Inlet feed gas is used as the main source of HP Fuel Gas. Periodically, condensate separated into the Heavies separators of each liquefaction train is injected into HP Fuel gas. Condensate quantity injected is low (about 1000kg/day) and its effect on the HP fuel composition is low. HP Fuel Gas composition is quite stable, during 2020 and average December 2020 compositions and properties are used in the calculation of CO2 and pollutants emission conversion factors.

Feed Gas Composition 2020 (used as HP Fuel Gas)													
Mol. Wt.	28.0134	16.04	30.07	44.1	Density	58.12	58.12	72.15	72.15	78.11	44.01	HHV	Sp. gravity
Comp.	**N2**	**CH4**	**C2H6**	**C3H8**	**kg/Sm3**	**i-C4H10**	**n-C4H10**	**iC5H12**	**nC5H12**	**C6+**	**CO2**	**BTU/scf**	
Full year (366 days)													
Avg day full year 2020	0.48	92.36	3.79	2.30	0.749	0.247	0.307	0.040	0.026	0.012	0.431	1084	0.612
30 first days of 2020													
Avg 30 first days 2020	0.51	92.47	3.73	2.23	0.749	0.247	0.313	0.043	0.028	0.013	0.429	1083	0.611
30 last days of 2020													
Avg 30 last days 2020	0.48	92.36	3.82	2.32	0.749	0.226	0.276	0.039	0.026	0.011	0.440	1083	0.611

Low pressure Fuel gas is extracted just after flash gas compression before the flash gas is used for regeneration purpose. LP Fuel Gas is used in Gas Engines, Main Boilers and Flare system. Average LP fuel Gas composition during December 2020 are used in calculation of CO2 and pollutant emissions conversion factors.

LP Fuel Gas Compositions 2020												
Mol. Wt.	28.0134	16.04	30.07	44.1	Density	58.12	58.12	72.15	72.15	78.11	**HHV**	Spr. Gr
Comp.	**N2**	**C1**	**C2**	**C3**	**Std. Density,**	**iC4**	**nC4**	**iC5**	**nC5**	**C6+**	**BTU/SCF**	
Full year (366 days)												
Avg day full year 2020	8.23	90.41	0.46	0.53	0.738	0.109	0.170	0.036	0.026	0.013	950.7	0.60
30 first days of 2020												
Aver. 30 first days	8.62	89.67	0.38	0.73	0.746	0.175	0.286	0.065	0.047	0.022	955.6	0.61
30 last days of 2020												
Aver. 30 last days	10.23	89.41	0.17	0.13	0.735	0.021	0.034	0.008	0.006	0.003	915.3	0.60

MGO Consumption

Sounding

Soundings are obtained by the sounding of storage and service tanks supplying the individual consumers. Port/ starboard boiler, A/B essential generator, emergency generator and A/B fire pump each have individual service tanks to be sounded.

Sounding is achieved by measuring the height of diesel level in tanks, which is entered into a sounding table for volume. The sounding table will account for a ships trim but not movements due to wind and sea state. Some amount of inaccuracy is expected due to this way of measuring. Especially large deep storage tanks such as 5P will be affected the most.

For the emergency generator and A/B fire pump each service tank has a level gauge fitted with direct volume readout.

Sounding table is available as part of ships stability calculation program.

Volume derived from table is for entering into daily report.

Soundings are collected once a day by utilities operators.

Reporting

Numbers are entered into the daily report by UT-CRO (Utility Control Room Operator) (document owner) who will confirm if consumption has taken place or the readings stem from a discrepancy during sounding.

For the emergency generator and A/B fire pump there is only a standard weekly test run of approx. 30 min. For this consumption we estimate 50 liters of consumption for each week for each unit. This is seen over a 52-week period if all units are tested weekly.

UT-CRO will update daily log with consumption for boilers and generators based on new volume received from tank sounding. Consumption will be entered in metric tons (MT) for values to be transferred to environmental report format.

End of month calculation will be reviewed according to actual running of consumers. Any recordings obtained on days where no consumption is recorded will be discarded in the overall consumption for the current month.

Bunkering of MGO must be recorded in a separate column and added to the total inventory. Bunker volume is not to be added as negative consumption in the monthly reporting.

Daily log file location and name:

1.FLNG Hilli Episeyo - DAILY REPORT

File location: O:\6. UTILITY

Operational procedures

For the emergency generator and A/B fire pump there is only a standard weekly test run of approx. 30 min. For this consumption we estimate 50 liters of consumption for each week for each unit. This is seen over a 52-week period if all units are tested weekly.

Transfer of MGO between deep storage tank and consumer service tanks must be avoided during running of the units. If transfer is required in order to ensure safe operation, then a separate sounding of the deep tank is to be obtained before and after transfer.

Due to the size of service tanks for each consumer it is considered very unlikely that the need for transfer will arise.

Appendix 2

Abreviation	Long form
FLNG	Floating Liquified Natural Gas Vessel
SO_X	Oxides of Sulphur
NO_X	Nitrogen oxides
PM	Particulate Matter
CH4	Methane
MW	Megawatt hour
LTIF	Lost Time Injury Frequency
TRCF	Total Recordable Case Frequency
CO2e	Carbon dioxide equivalent
H2S	Hydrogen sulphide
MGO	Marine Gas Oil
MDO	Marine Diesel Oil
R407C	Hydrofluorocarbon refrigerant
R407F	Hydrofluorocarbon refrigerant
N2O	Nitrous oxide
IMO	International Maritime Organization
LNG	Liquified Natural Gas
MMBTU	Metric Million British Thermal Unit
OCIMFs	Oil Companies International Marine Forum
DNV	Det Norske Veritas
MSCAT	Marine Systematic Cause Analysis Technique
RWCs	Restricted Worst-Case scenario
H&S	Health and Safety
PTD	Permanent Total Disabilities
PPD	Permanent Partial Disabilities
LWC	Lost Workday Cases
MTCs	Medical Treatment Case
BOSIET	Basic Offshore Safety Induction and Emergency Training
STCW	Standard for Training, Certification and Watchkeeping
OCS	Crew Management System
EMS	Environmental Management System
MARPOL	International Convention for the Prevention of Pollution from Ships
GRB	Garbage Record Book
ORB	Oil Record Book
OWS	Oily Water Separator
PSV	Platform Supply Vessel
Simployer	HR system for onshore employees
RR	Retention Rate
UT	Unavoidable Termination
BT	Beneficial Termination
AE	Average number of employees
IEA	International Energy Agency
LER's	Local Equipment room
mol	Molar mass
ppmv	part per million by volume
CF	Conversion Factor

Sm3	standard cubic meters of oil equivalents
HP	High Pressure
LP	Low Pressure
GT	Gas Turbine
LHV	Lower Heating Value
HHV	High Heating Value
NM -VOC	Non-Methane Volatile organic compounds
VOC	Volatile organic compounds
USEPA	U.S. Environmental Protection Agency
HFO	Heavy Fuel Oil
LSFO	Low Sulphur Fuel Oil
UT-CRO	Utility Control Room Operator
MT	Metric Tons