

LAPORAN INVENTARISASI EMISI GAS RUMAH KACA

PT PELAYARAN NASIONAL INDONESIA (PERSERO)



GREENHOUSE GAS INVENTORY REPORT

2024



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1. DESKRIPSI UMUM

GENERAL DESCRIPTION



PT Pelayaran Nasional Indonesia (Persero) (PELNI) merupakan badan usaha milik negara (BUMN) yang bergerak di bidang jasa transportasi laut untuk penumpang dan barang di wilayah perairan Indonesia. Berdiri sejak tahun 1952, PELNI berperan penting dalam mendukung konektivitas nasional dan pemerataan ekonomi melalui layanan pelayaran antar pulau, termasuk rute komersial dan perintis.

Perusahaan mengoperasikan armada kapal penumpang, kapal perintis, kapal rede, kapal tol laut, kapal barang non-penugasan, dan kapal ternak, serta mendukung kegiatan logistik nasional melalui anak perusahaan dan unit layanan terkait. Dalam menjalankan operasinya, PELNI berkomitmen terhadap praktik bisnis berkelanjutan dan upaya mitigasi perubahan iklim melalui pengelolaan emisi Gas Rumah Kaca (GRK) secara sistematis.

PT Pelayaran Nasional Indonesia (Persero) (PELNI) is a state-owned enterprise (SOE) engaged in sea transportation services for passengers and cargo across Indonesian waters. Established in 1952, PELNI plays a key role in strengthening national connectivity and promoting equitable economic development through its inter-island shipping services, covering both commercial and pioneer routes.

The Company operates a fleet of passenger vessels, pioneer vessels, rede vessels, sea toll vessels, non-mandated cargo ships, and livestock carriers, and supports national logistics activities through its subsidiaries and related service units. In carrying out its operations, PELNI is committed to sustainable business practices and to climate change mitigation through the systematic management of Greenhouse Gas (GHG) emissions.



1.1. Tujuan Pelaporan

Laporan ini disusun untuk memenuhi persyaratan ISO 14064-1:2018, yang mengatur tentang *quantification and reporting of greenhouse gas emissions and removals at the organizational level*.

Tujuan pelaporan adalah untuk:

- Mengidentifikasi dan mengkuantifikasi sumber emisi GRK dari seluruh kegiatan operasional PELNI sepanjang tahun kalender 2024;
- Menyediakan data dasar (*baseline*) untuk perencanaan strategi penurunan emisi dan efisiensi energi;
- Meningkatkan transparansi dan akuntabilitas perusahaan terhadap aspek lingkungan dalam konteks *Environmental, Social, and Governance* (ESG);
- Mendukung target nasional pengurangan emisi GRK sesuai *Nationally Determined Contribution* (NDC).

1.2. Struktur Organisasi

PELNI secara khusus telah membentuk sebuah Komite *Sustainability* yang salah satu fungsinya adalah untuk merumuskan kebijakan dan strategi keberlanjutan yang mencakup aspek lingkungan, sosial, dan tata kelola (ESG – *Environmental, Social, and Governance*), serta mengawasi rencana dan realiasi pelaksanaan ESG termasuk yang berkaitan dengan pelaporan inventarisasi emisi GRK.

Dalam rangka pelaksanaan inventarisasi emisi GRK tahun 2024, komite tersebut menugaskan tim Divisi Manajemen Risiko dan ESG yang bertanggung jawab untuk pengelolaan, pengumpulan, verifikasi, dan pelaporan data emisi GRK di seluruh unit kerja perusahaan. Komite ini dirancang untuk memastikan keterlibatan seluruh fungsi yang relevan serta menjamin keakuratan dan transparansi data yang dilaporkan.

1.1. Purpose of reporting

This report has been prepared to meet the requirements of ISO 14064-1:2018, which sets out the principles and guidance for the quantification and reporting of greenhouse gas emissions and removals at the organizational level.

The objectives of this reporting are to:

- Identify and quantify GHG emission sources from all PELNI's operational activities throughout the 2024 calendar year;
- Provide baseline data for planning emission reduction and energy efficiency strategies;
- Enhance the Company's transparency and accountability on environmental aspects within the Environmental, Social, and Governance (ESG) framework;
- Support the national GHG emission reduction targets as stated in the Nationally Determined Contribution (NDC).

1.2. Organization Structure

PELNI has specifically established a Sustainability Committee, one of whose functions is to develop sustainability policies and strategies that cover Environmental, Social, and Governance (ESG) aspects, as well as to oversee the planning and implementation of ESG initiatives, including those related to GHG emissions inventory reporting.

For the implementation of the 2024 GHG emissions inventory, the committee has assigned the Risk Management and ESG Division team to be responsible for managing, collecting, verifying, and reporting GHG emissions data across all company units. The committee is designed to ensure the involvement of all relevant functions and to safeguard the accuracy and transparency of the reported data.

1.3. Personil bertanggung jawab

Laporan ini disiapkan oleh tim Divisi Manajemen Risiko dan ESG, khususnya oleh tim Departemen Pengelolaan Lingkungan, Sosial, dan Tata Kelola (ESG) PT PELNI (Persero).

1.4. Periode Pelaporan

Laporan ini meliputi periode 1 Januari 2024 hingga 31 Desember 2024.

1.5. Standard Pelaporan

Laporan ini disusun yang selaras dengan kerangka dan persyaratan yang ditetapkan dalam SNI ISO 14064-1:2018 mengenai "Gas rumah kaca - Bagian 1: Spesifikasi dengan panduan pada tingkat organisasi untuk kuantifikasi dan pelaporan emisi dan serapan gas rumah kaca".

1.3. Persons Responsible

This report has been prepared by the Division of Risk Management and ESG team, specifically the Department of Environmental, Social, and Governance (ESG) of PT PELNI (Persero).

1.4. Reporting Period

The report covers for the reporting period of January 1, 2024 – December 31, 2024.

1.5. Reporting Standards

This report has been prepared in alignment with the framework and requirements set out in SNI ISO 14064-1:2018 on "Greenhouse gases – Part 1: Specifications with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals"



2. BATASAN ORGANISASI

ORGANIZATIONAL BOUNDARIES





PELNI telah menetapkan tahun buku 2024 sebagai tahun dasar (*baseline*) untuk tujuan perhitungan emisi GRK.

PELNI has defined 2024 financial year as the baseline for the purpose of the GHG emissions.

Sehubungan pelaporan inventarisasi GRK ini adalah yang pertama, sehingga tidak ada penjelasan dari setiap perubahan pada tahun dasar atau data historikal GRK lain atau kategorisasi dan setiap perhitungan ulang tahun dasar atau inventarisasi GRK historikal lainnya.

As this is the first GHG inventory report, there are no explanations regarding any changes to the base year, other historical GHG data or categorizations, nor any recalculations of the base year or other historical GHG inventories.

Emisi dalam laporan ini dikonsolidasikan menggunakan pendekatan kendali operasional (*operational control approach*). Di bawah pendekatan ini, PELNI melaporkan sebagian besar emisi yang berasal dari aset dan aktivitas yang berada di bawah kendali operasional PELNI.

The emissions in this report are consolidated using the operational control approach. Under this approach, PELNI reported most of emissions from assets and activities under PELNI's operational control.

Meskipun demikian, pelaporan kajian inventarisasi ini masih ada keterbatasan data operasional yang tidak seluruhnya aktual (*real-time*), seperti pada data konsumsi bahan bakar, sehingga menggunakan asumsi operasional standar dan data historis.¹

However, this inventory assessment report is still subject to limitations in operational data, which are not entirely available in actual (real time)—for example, fuel consumption data—so standard operating assumptions and historical data are used.

Daftar entitas pelaporan yang termasuk dalam inventaris ini disajikan pada Lampiran 1 laporan ini.

The list of reporting entities included in the inventory is provided in Appendix 1 of this report.

¹ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025



3. BATASAN PELAPORAN

REPORTING BOUNDARIES



PELNI menetapkan batasan pelaporan inventarisasi Gas Rumah Kaca (GRK) menggunakan pendekatan Kendali Operasional (*Operational Control Approach*). Di bawah pendekatan ini, perusahaan menghitung emisi GRK yang berasal dari aset dan aktivitas operasional yang berada sepenuhnya di bawah pengendalian operasional PELNI.

Namun, dalam implementasinya terdapat sejumlah keterbatasan data dan metodologi yang perlu dijelaskan untuk memastikan transparansi dan interpretasi hasil yang tepat.

Pendekatan ini selaras dengan SNI ISO 14064-1:2018 dan *GHG Protocol Corporate Standard*, serta mencakup seluruh fasilitas darat dan armada kapal yang dioperasikan perusahaan.

PELNI menerapkan metode *activity-based* untuk perhitungan emisi kapal, karena metode ini memberikan hasil yang lebih akurat dibandingkan *fuel-based*. Metode ini mempertimbangkan variasi efisiensi pembakaran berdasarkan fase operasi kapal (*cruising, maneuvering, hotelling*) serta beban kerja mesin utama dan mesin bantu.

3.1. Kategori dan Klasifikasi Emisi

Klasifikasi emisi disusun berdasarkan *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard* dan peraturan Kementerian Lingkungan Hidup dan Kehutanan (KLHK) Republik Indonesia.

Perhitungan emisi Gas Rumah Kaca (GRK) dalam penelitian ini dilakukan dengan metode *bottom-up*, mengacu pada persamaan, sesuai dengan ketentuan IPCC 2006.

Perhitungan emisi tahunan CO₂e dari kegiatan pelayaran dilakukan dengan terlebih dahulu menghitung emisi tiga gas rumah kaca utama, yaitu CO₂, CH₄, dan N₂O. Volume bahan bakar yang dikonsumsi selama satu tahun dikalikan dengan faktor emisi masing-masing jenis bahan bakar untuk mendapatkan emisi tiap gas. Emisi CH₄ dan N₂O tersebut kemudian dikonversi ke dalam satuan ekuivalen CO₂ (CO₂e) dengan mengalikan masing-masing nilai

PELNI establishes Greenhouse Gas (GHG) inventory reporting boundaries based on the Operational Control approach. Under this approach, the company accounts for GHG emissions from operations where it has the full authority to introduce and implement its operational policies.

However, in its implementation, there are a number of limitations in terms of data and methodology that need to be explained to ensure transparency and accurate interpretation of the results.

This approach is in line with SNI ISO 14064-1:2018 and the GHG Protocol Corporate Standard, and covers all land facilities and fleets operated by the company.

PELNI applies an activity-based method for calculating ship emissions, as this method provides more accurate results than a fuel-based method. This method takes into account variations in combustion efficiency based on the ship's operating phase (*cruising, maneuvering, hotelling*) as well as the workload of the main engine and auxiliary engines.

3.1. Emissions Categories and Classification

Emissions classification is arranged based on The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard and regulations of the Ministry of Environment and Forestry (KLHK) of the Republic of Indonesia.

Greenhouse gas (GHG) emissions in this study were calculated using the bottom-up method, referring to the equation, in accordance with IPCC 2006 provisions.

The annual CO₂e emissions from shipping activities are calculated by first determining the emissions of the three main greenhouse gases: CO₂, CH₄, and N₂O. The volume of fuel consumed over the year is multiplied by the emission factor for each fuel type to obtain the emissions of each gas. The CH₄ and N₂O emissions are then converted into carbon dioxide equivalent (CO₂e) by multiplying each emission value by the Global Warming



emisi dengan *Global Warming Potential* (GWP) masing-masing GRK. Total emisi CO₂e pelayaran diperoleh dari penjumlahan emisi CO₂, CO₂e dari CH₄, dan CO₂e dari N₂O. Di antara ketiga gas rumah kaca tersebut, CO₂ merupakan komponen yang paling signifikan.

Potential (GWP) of the respective greenhouse gas. The total CO₂e emissions from shipping are obtained by summing the emissions of CO₂, the CO₂e from CH₄, and the CO₂e from N₂O. Among these three greenhouse gases, CO₂ is the most significant component.

SCOPE 1 - EMISI LANGSUNG

SCOPE 1 - DIRECT GHG EMISSIONS

Sumber emisi yang dimiliki atau dikendalikan langsung oleh PT PELNI. Dalam konteks pelayaran, ini merupakan kontributor terbesar.

Sources of emissions owned or directly controlled by PT PELNI.



Pembakaran Bergerak Mobile Combustion

Pembakaran bahan bakar (HFO/MDO/HSD) pada mesin utama (*Main Engine*) dan mesin bantu (*Auxiliary Engine*) di kapal penumpang, kapal barang, dan kapal perintis. Termasuk pembakaran bahan bakar bensin atau solar untuk keperluan operasional kendaraan darat milik PELNI, seperti mobil, truk, dan motor dinas.

Fuel combustion (HFO/MDO/HSD) in Main Engines and Auxiliary Engines on passenger vessels, cargo vessels, and pioneer vessels. Including the burning of gasoline or diesel fuel for the operational needs of PELNI's land vehicles, such as official cars, trucks, and motorcycles.



Pembakaran Diam Stationary Combustion

Penggunaan generator set (Genset) di kantor pusat, kantor cabang, dan fasilitas bengkel/logistik.

Use of generator sets (Genset) at the head office, branch offices, and workshop/logistics facilities.



Emisi Fugitif Fugitive Emissions

Kebocoran refrigeran dari sistem pendingin (HVAC) di kapal dan gedung, serta sistem pemadam kebakaran (CO₂ system/Halon) di atas kapal.

Refrigerant leaks from cooling systems (HVAC) on ships and buildings, as well as fire suppression systems (CO₂ system/Halon) on board.

SCOPE 2 - EMISI TIDAK LANGSUNG DARI ENERGI

SCOPE 1 - INDIRECT ENERGY EMISSIONS



Emisi dari pembangkitan energi listrik yang dibeli dan dikonsumsi oleh PT PELNI.

Emissions from the generation of purchased electricity consumed by PT PELNI.



Penggunaan listrik dari jaringan PLN (Perusahaan Listrik Negara) untuk Kantor Pusat, Kantor Cabang, dan aset gedung lainnya.

Electricity usage from the PLN (State Electricity Company) grid for the Head Office, Branch Offices, and any other asset building.

3.2. Pencakupan Sumber Emisi

Inventarisasi ini mencakup fasilitas dan aset operasional berikut:

3.2. Emission Source Inclusion

This inventory includes the following operational facilities and assets:

Armada Kapal Vessels	- Kapal Penumpang yang dimiliki dan dioperasikan penuh oleh PT PELNI. Passenger Vessels owned and fully operated by PT PELNI. - Kapal Tol Laut & Perintis, Kapal Ternak, dan Kapal Rede yang dioperasikan penuh oleh PT PELNI. Sea Toll Cargo & Pioneer Vessels, Livestock Vessels, and Rede Vessels fully operated by PT PELNI.
Fasilitas Darat Land-based Facilities	- Kantor Pusat PT PELNI (Jl. Gajah Mada, Jakarta). Head Office PT PELNI (Jl. Gajah Mada, Jakarta). - Kantor Cabang (Surabaya, Makassar, Belawan, dll). Branch Offices (Surabaya, Makassar, Belawan, etc). - Fasilitas aset gedung lainnya yang dikelola sendiri. Self-managed other asset building facilities.
Kendaraan Operasional Operational Vehicles	Kendaraan dinas operasional darat yang dimiliki perusahaan. Company-owned operational ground vehicles.

3.3. Pengecualian Sumber Emisi

Sumber emisi berikut dikecualikan berdasarkan keterbatasan data:

3.3. Emission Source Exclusion

The following emission sources are excluded based on data limitations:

Kapal Sewa Jangka Pendek Spot Charter	Kapal yang disewa untuk periode singkat di mana PELNI tidak memiliki kendali atas efisiensi mesin. Vessels chartered for short periods where PELNI has no control over engine efficiency.
Aktivitas Tenan Tenant Activities	Penggunaan listrik oleh penyewa pihak ketiga di gedung milik PELNI Electricity use by third-party tenants in PELNI buildings.
Emisi Konstruksi Construction Emissionss	Emisi dari <i>docking</i> kapal di galangan pihak ketiga, karena masuk dalam Scope 1 galangan tersebut. Emissions from vessel docking at third-party shipyards, as they fall under the shipyard's Scope 1.
Emisi dari Jasa Keagenan Kapal Emissions from Shipping Agency Services	Emisi dari usaha jasa keagenan kapal untuk kapal-kapal yang bukan milik PELNI, baik dari domestik maupun luar negeri. Emissions associated with shipping agency services provided to vessels not owned by PELNI, including both domestic and international vessels.



3.4. Keterbatasan Pelaporan

Penetapan batasan pelaporan dalam inventarisasi GRK ini mengacu pada pendekatan *Operational Control* sesuai SNI ISO 14064-1:2018 dan GHG Protocol. Namun, dalam implementasinya terdapat sejumlah keterbatasan data dan metodologi yang perlu dijelaskan untuk memastikan transparansi dan interpretasi hasil yang tepat.

3.4.1. Keterbatasan Data Operasional

Mengacu pada *Manual Footprint Carbon* bagian 3.5, beberapa data operasional kapal belum tersedia dalam kondisi *real-time*, di antaranya:



Konsumsi bahan bakar yang masih berbasis logbook abstract harian dan belum optimalnya penggunaan *fuel monitoring system*.

Fuel consumption data which still rely on daily log abstracts and the fuel monitoring system has not yet been fully optimized.



Data durasi fase operasi kapal (*cruising, maneuvering, hotelling*) yang masih mengacu pada asumsi standar.

Operational phase duration data (*cruising, maneuvering, hotelling*) which rely on standard assumptions.



Data spesifik kapal terutama kapal tua menggunakan data *as-designed* yang mungkin berbeda dengan kondisi aktual.

Specific vessel data for older vessels use *as-designed* data, which may differ from actual conditions.



Data refrigeran pada beberapa kantor dan kapal yang masih menggunakan pencatatan manual.

Refrigerant data for ships and office buildings that are still manually recorded.



Data kendaraan operasional yang tidak sepenuhnya mencakup jarak tempuh tahunan.

Operational vehicle data that do not consistently include annual mileage.

Keterbatasan ini berpotensi menyebabkan variasi ketelitian dalam estimasi konsumsi bahan bakar dan emisi.

3.4. Reporting Limitations

The reporting boundary is established based on the Operational Control approach following SNI ISO 14064-1:2018 and the GHG Protocol. However, several data and methodological limitations exist and must be disclosed to ensure transparency and correct interpretation of the GHG inventory results.

3.4.1. Operational Data Limitations

Referring to Section 3.5 of the Footprint Manual, several operational data points for vessels are not available in real time, including:

These limitations may affect the accuracy of estimated fuel consumption and emissions.

3.4.2. Keterbatasan Metodologi

Metodologi *activity-based* yang digunakan pada perhitungan emisi kapal memerlukan sejumlah asumsi, termasuk:

1	Asumsi densitas bahan bakar (880 kg/m ³) Fuel density (880 kg/m ³)
2	Nilai NCV (43,21 TJ/Gg untuk Solar CN48) NCV value (43.21 TJ/Gg for Solar CN48)
3	Nilai faktor emisi B35 yang diturunkan berdasarkan proporsi FAME dan Solar Emission factor for B35 derived from FAME/Solar proportions
4	Estimasi SFOC berdasarkan tabel IMO 2021 sesuai tahun mesin SFOC values based on IMO 2021 tables
5	Pembagian proporsi konsumsi ME/AE berdasarkan GT kapal (80/20 atau 70/30) Allocation of ME/AE fuel consumption based on vessel GT (80/20 or 70/30)
6	Pembagian konsumsi berdasarkan fase operasional Distribution across operational phases

Asumsi-asumsi ini mengikuti pedoman IPCC 2006 dan IMO GHG Study, namun tetap mengandung ketidakpastian yang perlu dicatat sebagai batasan.

3.4.2. Methodological Limitations

The activity-based methodology applied for vessel emissions requires several assumptions, including:

These assumptions are aligned with IPCC 2006 Guidelines and IMO GHG Study but remain subject to inherent methodological uncertainty.

3.4.3. Keterbatasan Temporal dan Spasial

Beberapa data tidak berasal dari catatan primer tahun berjalan, melainkan data agregat atau historis tahun sebelumnya, misalnya:

- data listrik beberapa kantor menggunakan rata-rata bulanan 2023/2024,
- data kapal-kapal masih bervariasi antar unit dan belum seluruhnya menggunakan cara penyajian data yang seragam.

Selain itu, tidak seluruh kantor cabang memiliki pencatatan energi yang seragam sehingga masih terdapat perbedaan penyajian data (seperti perbedaan antara berdasarkan Catatan Konsumsi Energi terhadap berdasarkan Data Biaya Listrik).

3.4.3. Temporal and Spatial Limitations

Some data are not from year-specific primary sources and rely on aggregated or historical records, such as:

- electricity consumption for several offices based on 2023/2024 monthly averages,
- pioneer vessel data that remain heterogeneous and not fully standardized across units.

Additionally, not all branch offices maintain uniform energy reporting systems, creating occasional data discrepancy (for example, the difference between calculations based on Energy Consumption Records versus those based on Electricity Billing/Cost Data).



3.4.4. Keterbatasan Teknis

1. Proses integrasi data *bunker delivery note* (BDN) dengan *log abstract* belum sepenuhnya terdigitalisasi.
2. Beberapa sistem pendingin kapal belum memiliki catatan rutin kebocoran refrigeran.
3. Pada beberapa kantor, penggunaan genset tidak dicatat dalam sistem terstruktur.

3.4.4. Technical Limitations

1. Integration between bunker delivery notes (BDN) and daily ship logs is not yet fully digitalized.
2. Several cooling systems lack routine refrigerant leakage logs.
3. Generator usage in some offices is not tracked systematically.

3.4.5. Rekomendasi Perbaikan

Mengacu pada rekomendasi *Manual Footprint Carbon* bagian 3.5.6, PELNI disarankan untuk:

3.4.5. Improvement Recommendations

Based on Section 3.5.6 of the Footprint Manual, PELNI is recommended to:

1 Melakukan digitalisasi pemantauan konsumsi bahan bakar secara *real-time*.
Digitalize fuel consumption monitoring (real-time).

2 Meningkatkan sistem pelaporan refrigeran dan data energi kantor.
Improve refrigerant and electricity reporting systems.

3 Menetapkan sistem audit internal berkala untuk data GRK.
Establish routine internal audits for GHG data.



4. DATA INVENTARISASI GRK 2024

GHG INVENTORY DATA 2024



4.1. Pernyataan Konsolidasi Emisi GRK

Tabel berikut menyajikan ringkasan emisi GRK PELNI berdasarkan pendekatan *activity-based*.

4.1. Consolidated Statement of Greenhouse Gas Emissions

The following table presents the summary of PELNI's GHG emissions based on an activity based approach.

KATEGORI EMISI EMISSIONS CATEGORY	TAHUN DASAR BASE YEAR	TAHUN BERJALAN CURRENT YEAR	PERSENTASE PERCENTAGE
Sumber Emisi Utama Primary Emissions Source	2024	2024	SCOPE 1 + 2
SCOPE 1 - TOTAL EMISI LANGSUNG TOTAL DIRECT EMISSIONS	492.549	492.549	94.8%
 Pembakaran BBM Kapal Ship Fuel Combustion (ME+AE)	483.824	483.824	93.1%
 Kendaraan Operasional Darat Land Operational Vehicles	8.723	8.723	1.7%
 Emisi Genset Generator Emissions	2,17	2,17	0.00042%
 Emisi Fugitive Refrigeran Fugitive Refrigerant Emissions	N/A	N/A	N/A
SCOPE 2 - EMISI ENERGI TIDAK LANGSUNG INDIRECT ENERGY EMISSIONS	27.164	27.164	5.2%
 Listrik Kantor Pusat & Cabang Headquarters & Branch Office Electricity	27.164	27.164	5.2%
TOTAL EMISI (SCOPE 1 + 2) TOTAL EMISSIONS	519.713	519.713	100%

Satuan: ton CO₂ equivalent
Unit: tCO₂e



4.2. Metodologi Pengumpulan dan Analisis Data

PELNI menerapkan pendekatan metode *bottom-up* dengan formula:

$$\text{Emisi} = \text{Data Aktivitas} \times \text{Faktor Emisi} \times \text{GWP}$$

$$\text{Emissions} = \text{Activity Data} \times \text{Emission Factors} \times \text{GWP}$$

Inventarisasi Emisi pada tahun tercatat, yakni 2017-2023 masih menggunakan pendekatan *fuel-based*. Oleh karena itu, perlu penyesuaian nilai menggunakan faktor koreksi antara pendekatan *activity-based* dan *fuel-based*. Laporan ini mengungkapkan hasil perhitungan emisi menggunakan pendekatan *activity-based*.

A. Pengumpulan Data Aktivitas

1. Bahan Bakar Kapal
 - *Logsheet Abstract* harian kapal
 - *Bunker Delivery Note* (BDN)
 - Diverifikasi oleh Divisi Bahan Bakar
2. Konsumsi Listrik
 - Tagihan listrik (kWh) dari PLN
3. Refrigeran
 - Log pemeliharaan sistem pendingin kapal & Gedung

B. Faktor Emisi

Mengacu pada standar berikut:

1. IMO GHG Study
2. IPCC Guidelines 2006
3. Grid Emission Factor (ESDM 2024)
4. IPCC GWP AR5 (CO₂=1, CH₄=28, N₂O=265)

4.2. Methodology of Data Collection and Analysis

PELNI applies the bottom-up method with the following formula:

$$\text{Emisi} = \text{Data Aktivitas} \times \text{Faktor Emisi} \times \text{GWP}$$

$$\text{Emissions} = \text{Activity Data} \times \text{Emission Factors} \times \text{GWP}$$

The emissions inventory for the years on record, namely 2017-2023, still relied on a fuel-based approach. Therefore, an adjustment using a correction factor between the activity-based and fuel-based approaches is required. This report presents the emission calculation results using the activity-based approach.

A. Activity Data Collection

1. Ship Fuel
 - Daily ship log abstracts
 - Bunker Delivery Notes (BDNs)
 - Verified by the Fuel Division
2. Electricity Consumption
 - Electricity bills (kWh) from PLN
3. Refrigerants
 - Ship and building cooling system maintenance log

B. Emission Factors

Refer to the following standards:

1. IMO GHG Study
2. IPCC Guidelines 2006
3. Grid Emission Factor (ESDM 2024)
4. IPCC GWP AR5 (CO₂=1, CH₄=28, N₂O=265)

4.3. Perubahan dari Periode Sebelumnya

Pada periode pelaporan ini, status perubahan adalah sebagai berikut:

1. **Rekalkulasi:** Tidak ada perubahan signifikan pada metodologi yang mengharuskan rekalkulasi tahun dasar.
2. **Peningkatan Kualitas Data:** Transisi penggunaan data primer (*flow meter*) diperluas ke lebih banyak armada dibandingkan tahun sebelumnya.

4.3. Changes from Prior Reporting Period

In this reporting period, the status of changes is as follows:

1. **Recalculation:** No significant methodology changes requiring base year recalculation.
2. **Data Quality Improvement:** Transition to primary data usage (flow meters) expanded to more vessels compared to the previous year.

4.4. Tinjauan, Audit Internal & Perbaikan

Untuk menjamin integritas laporan, PT PELNI menerapkan:

1. **Kontrol Kualitas:** *Cross-check* data konsumsi BBM ditinjau melalui *Log Book* Kapal dan Laporan Hasil *Sounding* di Lapangan.
2. **Audit Internal:** Dilakukan oleh DPA-QHSSE terhadap kepatuhan prosedur ISO 14064.
3. **Rencana Perbaikan:**
 - Digitalisasi monitoring konsumsi bahan bakar secara *real-time*.
 - Implementasi peta jalan dekarbonisasi.

4.4. Review, Internal Audit & Improvement

To ensure report integrity, PT PELNI implements:

1. **Quality Control - QC:** Cross-check fuel consumption data reviewed through the Ship's Log Book and Field Sounding Reports.
2. **Internal Audit:** Conducted by DPA-QHSSE on ISO 14064 procedure compliance
3. **Improvement Plan:**
 - Digitalization of real-time fuel consumption monitoring.
 - Decarbonization roadmap implementation.



5. KESIMPULAN

CONCLUSION



Berdasarkan hasil inventarisasi emisi Gas Rumah Kaca (GRK) PT PELNI (Persero) tahun 2024 yang disusun mengacu pada SNI ISO 14064-1:2018 dan menggunakan pendekatan *bottom-up* berbasis aktivitas serta konsumsi bahan bakar (*fuel-based*), perusahaan telah memperoleh gambaran kuantitatif yang komprehensif mengenai jejak emisi dari kegiatan operasional pelayaran maupun perkantoran.

Total emisi GRK dari aktivitas pelayaran kapal pada tahun 2024 mencapai 483.824 ton CO₂e per tahun berdasarkan pendekatan *activity-based*. Angka ini menunjukkan bahwa operasi armada merupakan sumber utama emisi GRK perusahaan dan menjadi fokus utama upaya dekarbonisasi jangka menengah dan panjang.

Dari sisi aktivitas perkantoran, total emisi mencapai 35.889 ton CO₂e per tahun, dengan kontribusi terbesar berasal dari konsumsi listrik gedung (27.164 ton CO₂e per tahun atau sekitar 76%), diikuti oleh kendaraan operasional (8.723 ton CO₂e per tahun) dan penggunaan genset (±2,17 ton CO₂e per tahun).

Jika digabungkan, emisi dari pelayaran dan perkantoran memberikan total emisi sekitar 519 ribu ton CO₂e untuk tahun 2024, di mana sektor pelayaran menyumbang sekitar 93% dari total emisi operasional scope 1 dan 2 perusahaan.

Analisis lebih lanjut menunjukkan bahwa, dengan pendekatan *activity-based*, total emisi pelayaran diperkirakan 483.824 ton CO₂e per tahun, dengan porsi emisi terbesar terjadi pada fase *cruising* dan *maneuvering* (85%).

Nilai emisi spesifik yang dihasilkan adalah sekitar 0,5503 ton CO₂e per penumpang dan 0,0175 ton CO₂e per kg muatan, yang dapat digunakan sebagai indikator intensitas emisi untuk pemantauan kinerja dan perbandingan di tahun-tahun berikutnya.

Based on the results of PT PELNI (Persero)'s 2024 greenhouse gas (GHG) emissions inventory, which was compiled in accordance with SNI ISO 14064-1:2018 and using a bottom-up approach based on activities and fuel consumption, the company has obtained a comprehensive quantitative picture of the emission footprint of its shipping and office operations.

Total GHG emissions from vessel operations in 2024 amounted to 483,824 tCO₂e per year based on the activity-based approach. This figure indicates that fleet operations are the primary source of the company's GHG emissions and therefore the main focus for medium- and long-term decarbonization efforts.

For office activities, total emissions reached 35.889 tCO₂e per year, with the largest contribution coming from building electricity consumption (27,164 tCO₂e per year, or around 76%), followed by operational vehicles (8,723 tCO₂e per year) and generator use (approximately 2.17 tCO₂e per year).

Combined, emissions from shipping and office operations amount to a total of around 519 thousand tCO₂e in 2024, with the shipping segment accounting for approximately 93% of the company's total Scope 1 and Scope 2 operational emissions.

Further analysis shows that, using an activity-based approach, total shipping emissions are estimated at 483,824 tCO₂e per year, with the largest share occurring during the cruising and maneuvering phases (85%).

The resulting specific emissions are approximately 0.5503 tCO₂e per passenger and 0.0175 tCO₂e per kg of cargo, which can be used as emission intensity indicators for performance monitoring and benchmarking in subsequent years.



Total emisi GRK PT PELNI (Persero) tahun 2024

Total GHG emissions inventory PT PELNI (Persero) in 2024



Aktivitas pelayaran kapal
Vessel operations

483.824
ton CO₂e per tahun
tCO₂e per year

Aktivitas perkantoran
Office activities

35.889
ton CO₂e per tahun
tCO₂e per year

Hasil inventarisasi ini menegaskan bahwa upaya pengurangan emisi perlu diprioritaskan pada:

1. Peningkatan efisiensi energi dan optimasi operasi armada (termasuk program *slow-steaming*, perbaikan manajemen rute, dan pemanfaatan teknologi efisiensi seperti *waste heat recovery*), serta²
2. Efisiensi konsumsi listrik gedung dan pengelolaan kendaraan operasional di lingkungan perkantoran. *Roadmap* dekarbonisasi lima tahun 2025-2029 yang telah disusun memberikan kerangka implementasi bertahap untuk mencapai pengurangan emisi yang terukur dan konsisten.

The results of this inventory confirm that emission reduction efforts need to be prioritized in:

1. Improving energy efficiency and optimizing fleet operations (including slow-steaming programmes, enhanced route management, and the adoption of efficiency technologies such as waste heat recovery); and
2. Improving building electricity efficiency and the management of operational vehicles in office environments. The five-year decarbonization roadmap for 2025-2029 that has been prepared provides a phased implementation framework to achieve measurable and consistent emission reductions.



² Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025



LAMPIRAN

APPENDIX



**DAFTAR KAPAL DAN ENTITAS YANG TERMASUK
DALAM PELAPORAN**

Kapal dan kantor berikut termasuk dalam inventarisasi tahun 2024³:

LIST OF INCLUDED REPORTING VESSELS AND ENTITIES

The following vessels, and offices are included in the inventory for 2024:

JENIS KAPAL VESSEL TYPE	NAMA KAPAL VESSEL NAME	
Kapal Penumpang Passenger Vessel	Kelimutu	Lambelu
	Lawit	Sinabung
	Tidar	Kelud
	Tatamailau	Pangrango
	Sirimau	Sangiang
	Awu	Wilis
	Ciremai	Egon
	Dobonsolo	Dorolonda
	Leuser	Nggapulu
	Binaiya	Labobar
	Bukit Raya	Gunung Dempo
	Tilongkabila	Jet Liner
	Bukit Siguntang	Umsini
Kapal Perintis Pioneer Vessel	Sabuk Nusantara 42	Sabuk Nusantara 90
	Sabuk Nusantara 48	Sabuk Nusantara 91
	Sabuk Nusantara 52	Sabuk Nusantara 92
	Sabuk Nusantara 53	Sabuk Nusantara 93
	Sabuk Nusantara 58	Sabuk Nusantara 94
	Sabuk Nusantara 63	Sabuk Nusantara 95
	Sabuk Nusantara 68	Sabuk Nusantara 96
	Sabuk Nusantara 69	Sabuk Nusantara 97
	Sabuk Nusantara 75	Sabuk Nusantara 98
	Sabuk Nusantara 71	Sabuk Nusantara 100
	Sabuk Nusantara 78	Sabuk Nusantara 104
	Sabuk Nusantara 80	Sabuk Nusantara 105
	Sabuk Nusantara 81	Sabuk Nusantara 106
	Sabuk Nusantara 85	Sabuk Nusantara 108
	Sabuk Nusantara 86	Sabuk Nusantara 112

³ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025



JENIS KAPAL VESSEL TYPE	NAMA KAPAL VESSEL NAME	
Kapal Tol Laut Sea Toll Vessel	Logistik Nusantara 1	Logistik Nusantara 4
	Logistik Nusantara 2	Logistik Nusantara 5
	Logistik Nusantara 3	Logistik Nusantara 6
Kapal Tol Laut Sea Toll Vessel	Kendhaga Nusantara 7	Kendhaga Nusantara 11
	Kendhaga Nusantara 8	
Kapal Rede Rede Vessel	Gandha Nusantara 04	Gandha Nusantara 19
	Gandha Nusantara 07	Gandha Nusantara 16
	Gandha Nusantara 08	Gandha Nusantara 15
	Gandha Nusantara 09	Gandha Nusantara 05
	Gandha Nusantara 14	Gandha Nusantara 18
	Gandha Nusantara 10	Gandha Nusantara 06
	Gandha Nusantara 12	Gandha Nusantara 13
	Gandha Nusantara 20	Gandha Nusantara 17
Kapal Ternak Livestock Vessel	Camara Nusantara 01	





LOKASI LOCATION	PROVINSI PROVINCE	NAMA GRID GRID NAME	FAKTOR EMISI WILAYAH (tonCO ₂ /MWh)
Kantor Pusat (Head office) Jl. Gajah Mada No. 14, DKI Jakarta 10130	DKI Jakarta	Jamali	0.87
Kantor Kemayoran (Kemayoran branch office) Jl. Angkasa No.18 13, RT.9/RW.3, Gn. Sahari Sel., Kec. Kemayoran, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10610	DKI Jakarta	Jamali	0.87
Kantor PT Sarana Bandar Nasional (SBN) (SBN subsidiary office) Jl. Cempaka Putih Tengah II B.13-144, Cempaka Putih, DKI Jakarta - 10510	DKI Jakarta	Jamali	0.87
Kantor Pelita Djaya Indonesia Corporation (PIDC) (PIDC subsidiary office) Jalan Angkasa No 18 Kemayoran Jakarta Pusat Gedung Tiketing PT PELNI lantai 2	DKI Jakarta	Jamali	0.87
Cabang Jakarta (branch office)	DKI Jakarta	Jamali	0.87
Cabang Surabaya (branch office)	Jawa Timur	Jamali	0.87
Cabang Makassar (branch office)	Sulawesi Selatan	Sulselbar	0.95
Cabang Ambon (branch office)	Maluku	Ambon	0.66
Cabang Sorong (branch office)	Papua Barat	Sorong	0.56
Cabang Balikpapan (branch office)	Kalimantan Timur	Mahakam	1.14
Cabang Baubau (branch office)	Sulawesi Tenggara	Bau-Bau	0.74
Cabang Bitung (branch office)	Sulawesi Utara	Sulutgo	0.78
Cabang Jayapura (branch office)	Papua	Jayapura	0.51
Cabang Kupang (branch office)	Nusa Tenggara Timur	Timor	0.69
Cabang Manokwari (branch office)	Papua Barat	Manokwari	0.56
Cabang Medan (branch office)	Sumatera Utara	Sumatera	0.94
Cabang Ternate (branch office)	Maluku Utara	Ternate-Tidore	0.48
Cabang Parepare (branch office)	Sulawesi Selatan	Sulselbar	0.95
Cabang Semarang (branch office)	Jawa Tengah	Jamali	0.87
Cabang Tanjung Pinang (branch office)	Kepulauan Riau	Batam-Tanjung Pinang	0.82
Cabang Batam (branch office)	Kepulauan Riau	Batam-Tanjung Pinang	0.82

LOKASI LOCATION	PROVINSI PROVINCE	NAMA GRID GRID NAME	FAKTOR EMISI WILAYAH (tonCO ₂ /MWh)
Cabang Biak (branch office)	Papua	Biak	0.57
Cabang Denpasar (branch office)	Bali	3 Nusa	0.52
Cabang Fakfak (branch office)	Papua Barat	Sorong	0.56
Cabang Kumai (branch office)	Kalimantan Tengah	Barito	1.31
Cabang Larantuka (branch office)	Nusa Tenggara Timur	Adonara	0.59
Cabang Maumere (branch office)	Nusa Tenggara Timur	Maumere	0.56
Cabang Nabire (branch office)	Papua	Nabire	0.52
Cabang Namlea (branch office)	Maluku	Namlea	0.6
Cabang Nunukan (branch office)	Kalimantan Utara	Tarakan	0.48
Cabang Pontianak (branch office)	Kalimantan Barat	Khatulistiwa	1.63
Cabang Sampit (branch office)	Kalimantan Tengah	Barito	1.31
Cabang Serui (branch office)	Papua	Serui	0.59
Cabang Tarakan (branch office)	Kalimantan Utara	Tarakan	0.48
Cabang Tual (branch office)	Maluku	Tual	0.58
Cabang Bima (branch office)	Nusa Tenggara Barat	3 Nusa	0.52
Cabang Waingapu (branch office)	Nusa Tenggara Timur	Waingapu	0.55
Cabang Kaimana (branch office)	Papua Barat	Manokwari	0.56
Cabang Labuan Bajo (branch office)	Nusa Tenggara Timur	3 Nusa	0.52
Cabang Palu (branch office)	Sulawesi Tengah	Palapas-Palu	0.54
Cabang Dobo (branch office)	Maluku	Dobo	0.54
Cabang Ende (branch office)	Nusa Tenggara Timur	Ende	1.03
Cabang Kendari (branch office)	Sulawesi Tenggara	Kendari	1.02
Cabang Kotabaru / Batulicin (branch office)	Kalimantan Selatan	Mahakam	1.14
Cabang Luwuk (branch office)	Sulawesi Tengah	Luwuk	0.6
Cabang Merauke (branch office)	Papua	Merauke	0.55
Cabang Timika (branch office)	Papua	Timika	0.57
Cabang Nunukan (branch office)	Kalimantan Utara	Tarakan	0.48
Kantor Galangan Surya Surabaya (Strategic Business Unit/SBU office) Jl. Nilam Barat No. 39, Surabaya 60165	Jawa Timur	Jamali	0.87
Hotel Bahtera Cipayung (Strategic Business Unit/SBU hotel) Jl. Raya Puncak Cipayung, No. 256, Bogor	Jawa Barat	Jamali	0.87



Data Emisi Kapal - Metode Activity-Based (Sumber utama perhitungan Scope 1)

Vessel Emissions Data - Activity-Based Method (Main source for Scope 1 calculations)

Ringkasan Emisi Activity-Based Tahun 2024⁴

Summary of Activity-Based Emissions for 2024⁴

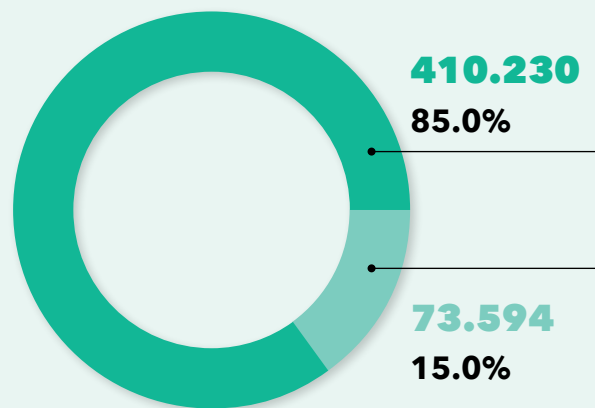
Total Emisi Kapal
Total Vessel Emissions

483.824 ton CO₂e
tCO₂e

Berdasarkan Fase Operasional
(tonCO₂e)

Based on Operational Phase (tCO₂e)

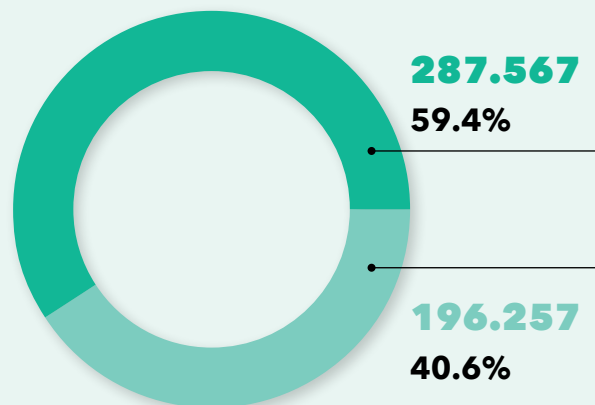
-  **Emisi Cruising & Maneuvering**
Cruising & Maneuvering Emissions
-  **Emisi Hotelling**
Hotelling Emissions



Berdasarkan Jenis Mesin
(tonCO₂e)

Based on Engine Type (tCO₂e)

-  **Emisi Main Engine (ME)**
Main Engine Emissions
-  **Emisi Auxiliary Engine (AE)**
Auxiliary Engine Emissions



⁴ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025

Data Emisi Fuel-Based (Referensi Pembanding) - (Untuk QA/QC per ISO 14064-1)

Fuel-Based Emissions Data (Comparative Reference)⁵ - (QA/QC purpose as per ISO 14064-1)

Data Emisi Fuel-Based
Fuel-Based Emissions Data

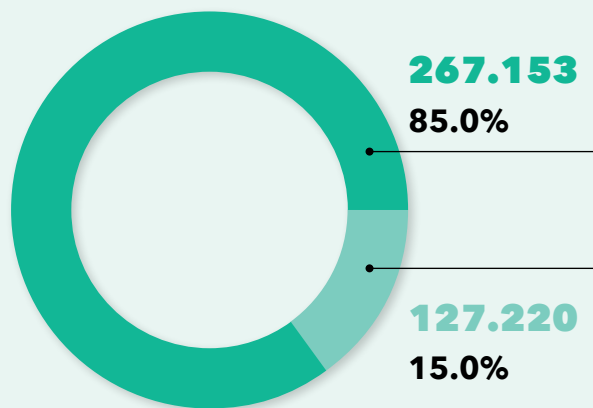
Total Emisi Fuel-Based
Total Fuel-Based Emission

394.373 ton CO₂e
tCO₂e

Berdasarkan Fase Operasional
(tonCO₂e)

Based on Operational Phase (tCO₂e)

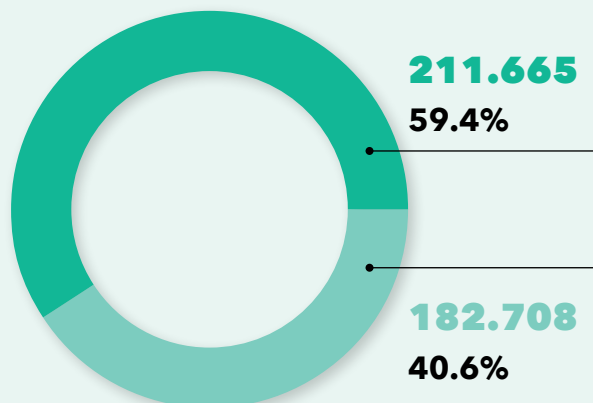
- **Emisi Cruising & Maneuvering**
Cruising & Maneuvering Emissions
- **Emisi Hotelling**
Hotelling Emissions



Berdasarkan Jenis Mesin
(tonCO₂e)

Based on Engine Type (tCO₂e)

- **Emisi Main Engine (ME)**
Main Engine Emissions
- **Emisi Auxiliary Engine (AE)**
Auxiliary Engine Emissions



⁵ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025



Konsumsi Listrik & Emisi Scope 2 (Mendukung Bagian 4.1 Scope 2)
Electricity Consumption & Scope 2 Emissions⁶ (Supporting Section 4.1 Scope 2)

Konsumsi Energi (kWh) & Emisi Listrik (ton CO₂e)
Electricity Consumption (kWh) & Emission from Electricity (tCO₂e)

3.714.806 kWh

38.794 ton CO₂e
tCO₂e



Berdasar catatan energi
Technical record based

2.601.184 kWh

27.164 ton CO₂e
tCO₂e



Berdasar billing
Billing based

⁶ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025

Emisi Kendaraan Operasional Darat (Mendukung Scope 1 - Land-based Mobile Sources)⁷

Emissions from Land-Based Operational Vehicles (Supporting Scope 1 - Land-Based Mobile Sources)⁷

Emisi per Jenis Kendaraan (ton CO₂e)
Emissions per Vehicle Type (tCO₂e)



24,28

Truk
Truck



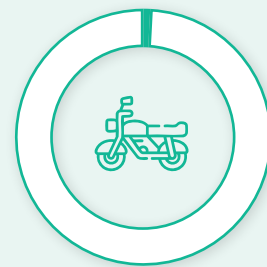
0

Bus
Bus



8.624

Mobil
Car



74,67

Motor
Motorcycle

Total Emisi Kendaraan
Total Vehicle Emissions

8.723 ton CO₂e
tCO₂e

Emisi Genset (ton CO₂e)
Generators Emission (tCO₂e)



Penggunaan bensin/solar/diesel
Usage of Fuel gasoline / diesel

2,17 ton CO₂e
tCO₂e

⁷ Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero). PT. PELNI (Persero). 2025



Faktor Emisi dan Referensi Perhitungan (Sesuai ISO 14064-1 & IPCC AR5)

Emission Factors and Reference Calculations (According to ISO 14064-1 & IPCC AR5)

A. Faktor Emisi Bahan Bakar Kapal

Ship Fuel Emission Factors

Nilai Faktor Emisi (FE) CO₂ Nasional dan Nilai Kalor Netto (Net Calorific Value/ NCV) BBM Nasional

National CO₂ Emission Factor and National Fuel Net Calorific Value (NCV)⁸

No	Jenis Bahan Bakar Minyak Fuel Type	FE Nasional (Ton CO ₂ /TJ)	FE Lower	FE Upper	NCV Nasional (TJ/Gg)	NCV Lower	NCV Upper
1	Bensin RON 98 Gasoline RON 98	68.91	67.4	70.4	44.62	44.58	44.66
2	Bensin RON 92 Gasoline RON 92	69.04	66.6	71.5	44.61	44.56	44.66
3	Bensin RON 90 Gasoline RON 90	69.29	66.7	71.9	44.61	44.57	44.65
4	Bensin RON 88 Gasoline RON 88	69.67	67.3	72.1	44.61	44.55	44.67
5	Avtur Jet Fuel (Avtur)	72.36	71.5	73.3	43.81	43.78	43.84
6	Minyak Tanah Kerosene	72.43	71.5	73.4	43.75	43.55	43.95
7	Minyak Solar CN 53 Diesel Fuel CN 53	72.85	71.9	73.9	43.55	43.52	43.58
8	Minyak Solar CN 51 Diesel Fuel CN 51	72.93	71.9	74.0	43.43	43.38	43.48
9	Minyak Solar CN 48 Diesel Fuel CN 48	73.28	72.1	74.5	43.27	43.20	43.34
10	Minyak Diesel Diesel Oil	74.52	73.9	75.2	42.63	42.58	42.68
11	Minyak Bakar Fuel Oil	77.90	76.3	79.5	40.79	40.56	41.02

⁸ <https://www.esdm.go.id/assets/media/content/content-faktor-emisi-bahan-bakar-minyak-bbm-dan-batubara.pdf>

B. Faktor Emisi Kelistrikan

Grid Emission Factor

- Jamali (2019): 0,87 tonCO₂e/MWh
- Luar Jawa / Outside Java (2019)⁹ : sesuai Kementerian ESDM / as per Ministry of Energy and Mineral Resources)

C. Global Warming Potential (GWP) - IPCC AR5

Gas	GWP
CO ₂	1
CH ₄	28
N ₂ O	265
R-22	1.760
R-404A	3.922
R-410A	2.088



⁹ Faktor Emisi Gas Rumah Kaca (GRK) Sistem Interkoneksi Ketenagalistrikan, Daftar Dokumen Download : https://gatrik.esdm.go.id/frontend/download_index/?kode_category=emisi_pl



Indeks Konten Laporan GRK

GHG report content Index ISO 14064-1:2018

Butir ISO ISO content	Persyaratan ISO ISO Requirement 14064-1:2018	Status	Lokasi dalam Laporan PELNI 2024 Section in this report	Catatan / Rekomendasi Notes / Recommendation
a	Deskripsi organisasi Organization description	Terpenuhi Completed	Bab 1 – Deskripsi Umum Chapter 1 – General Description	Sudah lengkap Completed
b	Personil/pelaksana yang bertanggung jawab Responsible Personnel/ Implementers	Terpenuhi Completed	Bab 1 – Personil Bertanggung Jawab Chapter 1 – Responsible Personnel	Sudah lengkap Completed
c	Periode pelaporan Responsible Person/ Executor	Terpenuhi Completed	Bab 1 – Periode Pelaporan (2024) Chapter 1 – Reporting Period (2024)	Sudah jelas Completed
d	Batas organisasi Organizational boundaries	Terpenuhi Completed	Bab 2 – Batasan Organisasi Chapter 2 – Organizational Boundary	Sudah menyebut Operational Control Explicitly mentions Operational Control
e	Batas pelaporan + kriteria signifikan Reporting Boundaries + Significant Criteria	Terpenuhi Completed	Bab 3 – Batasan Pelaporan; Bab 3.1 Kategori dan Klasifikasi Emisi Chapter 3 – Reporting Boundary; Chapter 3.1 Emission Categories and Classifications	Sudah memuat GRK yang signifikan Already contains significant GHG
f	Emisi GRK langsung dipisah per gas (CO ₂ , CH ₄ , N ₂ O, dll.) Direct GHG emissions are separated by gas (CO ₂ , CH ₄ , N ₂ O, etc.)	Terpenuhi Completed	Bab 4.1 – Total Emisi dalam tCO ₂ e Chapter 4.1 – Total Emissions in tCO ₂ e	Kontribusi CH ₄ /N ₂ O diakumulasi dalam tCO ₂ e CH ₄ /N ₂ O contribution is accumulated in tCO ₂ e
g	Perlakuan CO ₂ biogenic Biogenic CO ₂ treatment	Terpenuhi Completed	Diasumsikan 0 Assumed 0	Pernyataan CO ₂ biogenik terkait B35 – CN48

Butir ISO ISO content	Persyaratan ISO ISO Requirement 14064-1:2018	Status	Lokasi dalam Laporan PELNI 2024 Section in this report	Catatan / Rekomendasi Notes / Recommendation
h	Serapan GRK langsung (removals), jika ada Direct GHG removals, if any	☒ Terpenuhi ☐ Completed	Tidak ada serapan langsung No direct removal	Tidak relevan pada aktivitas di PELNI namun harus dinyatakan "Tidak terdapat removals" pada laporan "Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero)" Not relevant to activities at PELNI but must be stated as "No removals" in the report "Perhitungan Emisi Scope 1 & 2 dari Aktivitas Operasional PT. PELNI (Persero)"
i	Penjelasan pengecualian sumber signifikan Explanation of significant source exclusions	☒ Terpenuhi ☐ Completed	Bab 3.3 - Pengecualian Sumber Emisi Chapter 3.3 - Emission Source Exclusions	Sudah memuat materialitas dan keterbatasan data Already includes materiality and data limitations
j	Emisi GRK tidak langsung, dipisah berdasarkan kategori Indirect GHG emissions, disaggregated by category	☒ Terpenuhi ☐ Completed	Bab 4.1 - Emisi Listrik (Scope 2) Chapter 4.1 - Electricity Emissions (Scope 2)	Scope 3 tidak termasuk Scope 3 not included
k	Tahun dasar & hasil inventaris tahun dasar Base year & base year inventory results	☒ Terpenuhi ☐ Completed	Bab 2 - Baseline 2024 Chapter 2 - 2024 Baseline	Sudah lengkap Completed
l	Rekalkulasi tahun dasar / data historis Base year recalculation / historical data	☒ Terpenuhi ☐ Completed	Bab 4.3 - Perubahan / Rekalkulasi Chapter 4.3 - Changes/ Recalculations	"Tidak ada rekalkulasi" "No recalculation"
m	Pendekatan kuantifikasi & alasan pemilihan Quantitization approach & rationale for selection	☒ Terpenuhi ☐ Completed	Bab 4.2 - Metodologi Pengumpulan dan Analisis Data Chapter 4.2 - Data Collection and Analysis Methodology	Sudah memuat alasan pemilihan metode Already includes the reasons for selecting the method



Butir ISO ISO content	Persyaratan ISO ISO Requirement 14064-1:2018	Status	Lokasi dalam Laporan PELNI 2024 Section in this report	Catatan / Rekomendasi Notes / Recommendation
n	Perubahan pendekatan kuantifikasi yang sebelumnya digunakan Changes to previously used quantification approach	Terpenuhi Completed	Bab 4.2 - Metodologi Pengumpulan dan Analisis Data Chapter 4.2 - Data Collection and Analysis Methodology	Penyesuaian nilai menggunakan faktor koreksi antara pendekatan fuel-based dan activity-based Adjustment of values using correction factors between fuel-based and activity-based approaches
o	Referensi faktor emisi & GWP Reference emission factors and GWP	Terpenuhi Completed	Bab 4.2 & Lampiran 6 Chapter 4.2 & Appendix 6	Sudah lengkap Completed
p	Dampak ketidakpastian terhadap akurasi data Impact of uncertainty on data accuracy	Terpenuhi Completed	Bab 3.4 - Keterbatasan Chapter 3.4 - Limitations	Tingkat ketidakpastian (uncertainty) dalam pengukuran dan perhitungan emisi diperkirakan dalam rentang $\pm 10-15\%$, yang merupakan rentang standar untuk inventarisasi emisi sektor transportasi.
q	Deskripsi & hasil penilaian ketidakpastian Description and results of uncertainty assessment	Terpenuhi Completed	Bab 3.4 - Keterbatasan Chapter 3.4 - Limitations	Perlu penilaian ketidakpastian (qualitative/semi-quantitative)
r	Pernyataan laporan disusun sesuai ISO 14064-1 Report statements prepared in accordance with ISO 14064-1	Terpenuhi Completed	Bab 1 - Standard Pelaporan Chapter 1 - Reporting Standards	Sudah lengkap Completed
s	Status verifikasi & jenis jaminan Verification status & type of guarantee	Terpenuhi Sebagian Partially fulfilled	Bab 4.4 - Audit Internal Chapter 4.4 - Internal Audit	Perlu pernyataan: belum diverifikasi eksternal Statement required: not externally verified
t	GWP yang digunakan dan sumbernya GWP used and its source	Terpenuhi Completed	Bab 4.2 & Lampiran 6 Chapter 4.2 & Appendix 6	IPCC AR5







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