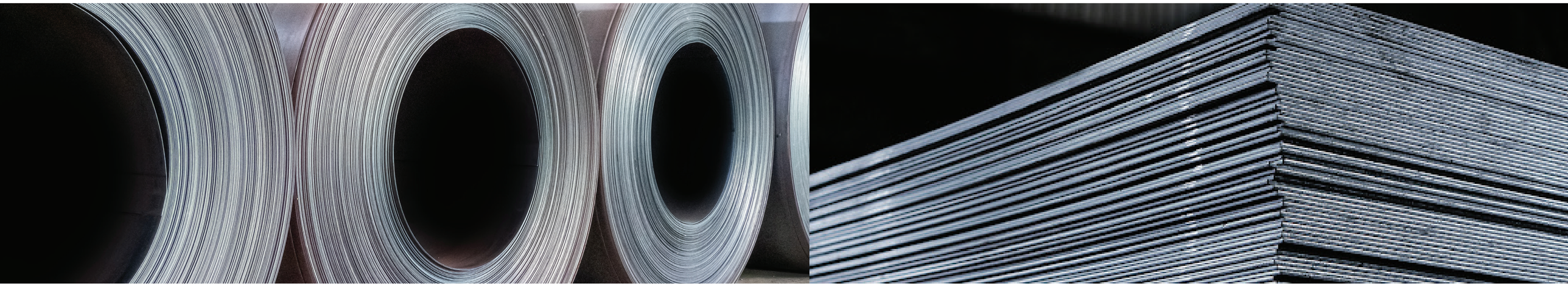
Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Hot Rolled Coil & Sheet
(Meeting ASTM/ASME Standard)

This EPD is for multiple products, covering:

- Hot Rolled Coil ASTM/ASME
- Hot Rolled Sheet ASTM/ASME



From

SHAPING TOMORROW

PT Gunung Raja Paksi Tbk

Jl. Perjuangan No.8, RT.004/RW.006, Sukadanau,
Kec. Cikarang Barat, Bekasi, West Java 17530, Indonesia

Programme
The International EPD® System,
www.environdec.com

EPD registered through the fully aligned regional hub
EPD Southeast Asia,
https://www.epd-southeastasia.com/

Programme operator
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Regional Hub
EPD Southeast Asia

EPD registration number
S-P-06676

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General information

Programme information

Programme	**The International EPD ® System** EPD registered through the fully aligned regional hub: EPD Southeast Asia	
Address:	**EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden **EPD Southeast Asia** Kencana Tower Level M, Business Park Kebon Jeruk Jl. Raya Meruya Ilir No. 89, Jakarta Barat 11620, Indonesia	**Website** www.environdec.com www.epd-southeastasia.com **Email** info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product category rules (PCR): CEN standard EN 15804:2012+A2:2019 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Product Category Rules (PCR) of Construction Products (PCR 2019:14 Version 1.2.5) and UN CPC 41211
PCR review was conducted by: The Technical Committee of the International EPD® System. **Review chair:** Claudia A. Peña, ADDERE Research & Technology. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA) LCA accountability: PT Life Cycle Indonesia
Third-party verification Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☑ EPD verification by individual verifier
Third party verifier: Claudia A. Peña, ADDERE Research & Technology **Approved by:** The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☑ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Description of the organisation

Established in 1970 in Medan, North Sumatra, the company with the name of PT Gunung Naga Mas, started the business by producing hot steel, gradually producing beams and steel sheets. In 1991, PT Gunung Naga Mas transitioned to PT Gunung Raja Paksi (GRP). GRP is located in Cikarang Barat, West Java Province, Indonesia, covering more than 200 hectares. By now, GRP has achieved production capacity of around 2.2 million tonnes per year. In the coming years, GRP will continue to grow and ensure the fulfillment of the need for high quality steel products.

As one of the largest private steel companies in Indonesia, PT Gunung Raja Paksi Tbk (GRP), a member of Gunung Steel Group, has a vision to be the most competitive and valuable benchmark for large private steel companies in Indonesia. To become a world-class integrated steel manufacturer, GRP always nurtures a culture of continuous improvement through achievement and advancement in all fields of development. The mission of the company is to ensure stakeholders' and customers' satisfaction through innovation, efficiency, productivity, quality products and services as well as company social responsibility.

GRP continues to show sustainable growth in all areas. Until now, there are more than 4 500 qualified employees, who have undergone rigorous training, helping Gunung Steel Group (GSG) achieve corporate success in Indonesia. The company is committed to always operating beyond compliance, including on the aspect of the environment. Therefore, GRP is very concerned about the quality of products and its management system. The ability of GRP has been proven by international market customers in Asia, South Asia, Australia, Africa, Europe, Middle East, and America.

Product-related or management system-related certifications

This is evident from the many international certifications obtained such as

- ABS (American Bureau of Shipping) certification no STML-T2369458 and Task - T2369458 & T2350985 certification no. STML -T2369458
- ACRS (Australasian Certification Reinforcing and Structural Steel) 3678 certification no 171202
- BKI (Biro Klasifikasi Indonesia) certification no 00104.20.TP0119
- BSI (British Standards Institution) ISO 14001:2015 certification no EMS 739669
- BV (Bureau Veritas) certification no 53330 A0 BV, 53331 A0 BV, 53332 A0 BV, 53333 A0 BV
- ISO 17025:2017 certification no. LP-786-IDN
- ISO 45001:2018 certification no OHS 727495
- JIS-JQA certification no JQID16002-002
- LR (Lloyd's Register) certification no LR23145678WA and QA ISO 9001:2015 no. 10499914
- LR QA certification no. 2814/CPR/MUM/0610008/1 and 0038-CPR-MUM-2210002-1
- Membership of Climate Action CO2 Worldsteel Association
- SIRIM (Standard and Industrial Research Institute of Malaysia) certificatio no PC001331
- SNI (Indonesian National Standard) 07-0601-2006 certification no. 601/W/EX/B/XI.10/2015

Details of GRP's commitment to sustainable development can be found in the company's sustainability report.

Name and location of production site(s)

Jl. Perjuangan No.8, RT.004/RW.006, Sukadanau, Kec. Cikarang Barat, Bekasi 17530, West Java, Indonesia

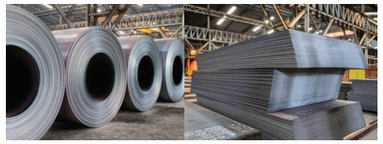
Product information

Product name

Hot Rolled Coil and Sheet ASTM/ASME

Product identification

ASTM/ASME



Product description

Hot rolled coil and sheet are made from slab which where deformed in the continuous/semi-continuous type hot rolling mill with AGC facilities using Gamma-ray or equivalent thickness gauge to monitor and control variation of thickness along the length to gain a desirable dimension of a hot rolled coil and sheet. This EPD is for multiple products based on weighted average results, covering hot rolled coil ASTM/ASME and hot rolled sheet ASTM/ASME. The provided data represents the average environmental performance of various grades and specifications of these hot rolled coil and hot rolled sheet, taking into account the total production volume of GRP's steel products over a one-year period within the study timeframe. The results are a weighted average of the environmental performance of all products included in the EPD. The GRP's products conform to the ASTM/ASME specifications as listed in Table 1.

Table 1. Product Standard GRP

Steel Type	General Description	Typical Uses	Specification Standard
Structural Mild Steel	• Hot rolled structural mild steel with nominal 250 – 300 MPa yield strength. • For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous mill. The edges of the sheet may be either trimmed or untrimmed	• Structural steel for general construction • Structural Steel Work for fabrication and erection • Bridge design • Buildings	• ASTM A36/ASME SA36 • ASTM A283/ ASME SA283 GR C
High Strength Structural Steel	• Hot rolled High Strength Steel with nominal 350 MPa yield strength. • For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous mill. The edges of the sheet may be either trimmed or untrimmed.	• Structural steel for general construction • Structural Steel Work for fabrication and erection • Bridge design • Buildings • Storage Tanks	• ASTM A573/ASME SA573 GR 70
High Strength Steel Low-Alloy	• Hot rolled High Strength Steel with nominal 350 MPa yield strength. • For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous mill. The edges of the sheet may be either trimmed or untrimmed.	• Structural steel for general construction • Structural Steel Work for fabrication and erection • Bridge design • Buildings • Storage Tanks	• ASTM A572 GR 42, 50, 60 • ASTM A588 GR B • ASTM A242/ASME SA242 • ASTM A633/ASME SA633 GR A,C,D • ASTM A709/ASME SA709 GR 50
Shipbuilding grade	• Hot rolled ordinary-strength structural steel with nominal 235 MPa yield strength. • Hot rolled high-strength structural steel with nominal 315 MPa yield strength. • For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous mill. The edges of the sheet may be either trimmed or untrimmed.	• Structural steel for general construction • Ship construction	• ASTM A131/ASME SA131 GRADE A, B, D, E • ASTM A131/ASME SA131 GRADE AH/DH/EH 32
Pressure Vessel (PV) Grades	• Hot rolled pressure vessel as per ASTM A285/ ASME SA285 and ASTM A516/ ASME SA516. • For Coil and Sheet, it is supplied in cut lengths and produce by cutting from a coil rolled on a continous mill. The edges of the sheet may be either trimmed or untrimmed	• Welded boilers • Pressure vessels	• ASTM A285/ASME SA285 • ASTM A516/ ASME SA516

Coil and Sheet Size

Maximum width is 1 524 mm and length is 12 000 mm which GRP capable to supply. However, other dimensional (custom) may be ordered by agreement.

Table 2. Standard GRP Coil and Sheet Size

Specification and Grade	Maximum Length (mm)			
	Thickness Range (mm)	Width Range (mm)		
		900 - 1 070	1 070 -1 219	1 219 – 1 524
ASTM A36/ASME SA36 ASTM A283/ ASME SA283 Gr. C ASTM A131/ASME SA131 GRADE A, B, D ASTM A285/ASME SA285	2 ≤ T ≤ 3	4 000	4 000	-
	3 < T ≤ 4.5	6 000	6 000	-
	4.5 < T ≤ 6	12 000	12 000	12 000
	6 < T ≤ 8	12 000	12 000	12 000
	8 < T ≤ 9	12 000	12 000	12 000
	9 < T ≤ 24	12 000	12 000	12 000
ASTM A573/ASME SA573 ASTM A572/ASME SA572 ASTM A588/ASME SA588 GR B ASTM A131/ASME SA131 GRADE AH/DH/EH 32 ASTM A709/ASME SA709 GR 50 ASTM A242/ASME SA242 ASTM A633/ASME SA633 GR A,C,D ASTM A516/ ASME SA516	6 ≤ T ≤ 9	-	12 000	12 000
	9 < T ≤ 16	-	12 000	12 000
	*Minimum Length 2 000 mm			

Fabricating Performance

Fabricating performance is an indicator of the steel to show the level of facility and suitability of the material to perform into other products such as welding or cold forming. GRP Product is applicable to have bending and welding method with succesfull rate ≥ 8.

Table 3. Fabricating Performance

Method	Rating
Bending	**8**
Welding	**9**
1 = Limited	10 = Excellent

Specification Standard

The standar specification is based on ASTM/ASME with the following grade. The mechanical properties are shown at Table 4. Additional impact test is also shown in Table 5.

Table 4. Mechanical Properties.

Specification & Grades	Applicable Thickness in GRP (mm)	Tensile Test (Transversal)				
		YS (N/mm²)	TS (N/mm²)		EL (%)	
					200	50
		Min	Min	Max	Min	Min
ASTM A283/ASME SA 283 Gr. C	2 ≤ T ≤ 16	205	380	515	22[A]	25[A]
ASTM A285/ASME SA285 Gr. A	2 ≤ T ≤ 16	165	310	450	27	30
ASTM A285/ASME SA285 Gr. B	2 ≤ T ≤ 16	185	345	485	25	28
ASTM A285/ASME SA285 Gr. C	2 ≤ T ≤ 16	205	380	515	23	27
ASTM A36/ASME SA36	2 ≤ T ≤ 16	250	400	550	20[A]	23[A]
ASTM A131/ASME SA A131 Gr. A/B/D	2 ≤ T ≤ 16	235	400	520	21	24
ASTM A572/ASME SA572 Gr. 42 [C]	6 ≤ T ≤ 16	290	415	-	20[A]	24[A]
ASTM A572//ASME SA572 Gr. 50 [C]	6 ≤ T ≤ 16	345	450	-	18[A]	21[A]
ASTM A572//ASME SA572 Gr. 60 [C]	10 ≤ T ≤ 16	415	520	-	16[A]	18[B]
ASTM A573/ASME SA573 Gr. 70 [C]	6 ≤ T ≤ 16	290	485	620	18[A]	21[A]
ASTM A588.ASME SA588 Gr.B [C]	6 ≤ T ≤ 16	345	485		18	21
ASTM A242/ASME SA242	6 ≤ T ≤ 16	345	480	-	18	21
ASTM A516/ASME SA516 Gr. 55	6 ≤ T ≤ 16	205	380	515	23	27
ASTM A516/ASME SA516 Gr. 60	6 ≤ T ≤ 16	220	415	550	21	25
ASTM A516/ASME SA516 Gr. 65	6 ≤ T ≤ 16	240	450	585	19	23
ASTM A516/ASME SA516 Gr. 70	6 ≤ T ≤ 16	260	485	620	17	21

Remarks:
[A] For plates wider than 24 in. [600 mm], the elongation requirement is reduced two percentage points.
[B] For plates wider than 24 in. [600 mm], the elongation requirement is reduced three percentage points.
[C] Produced for coil plate only.

Table 5. Impact Test

Specification & Grades	Thickness Range (mm)	Temp (°C)	Minimum Absorbed Energy (J)
ASTM A 131/ASME SA131 Gr. A	50 ≤ T ≤ 70	+20	34
ASTM A 131/ASME SA131 Gr. B	≤ 50	0	27
	50 ≤ T ≤ 70		34
ASTM A 131/ASME SA131 Gr. D	≤ 50	-20	27
	50 ≤ T ≤ 70		34
ASTM A 131/ASME SA131 Gr. E	≤ 50	-40	27
	50 ≤ T ≤ 70		34
ASTM A 131/ASME SA131 Gr. AH 32	≤ 50	0	31
	50 ≤ T ≤ 70		38
ASTM A 131/ASME SA131 DH 32	≤ 50	-20	31
	50 ≤ T ≤ 70		38
ASTM A 131/ASME SA131 Gr. EH 32	≤ 50	-40	31
	> 50 – ≤ 70		38

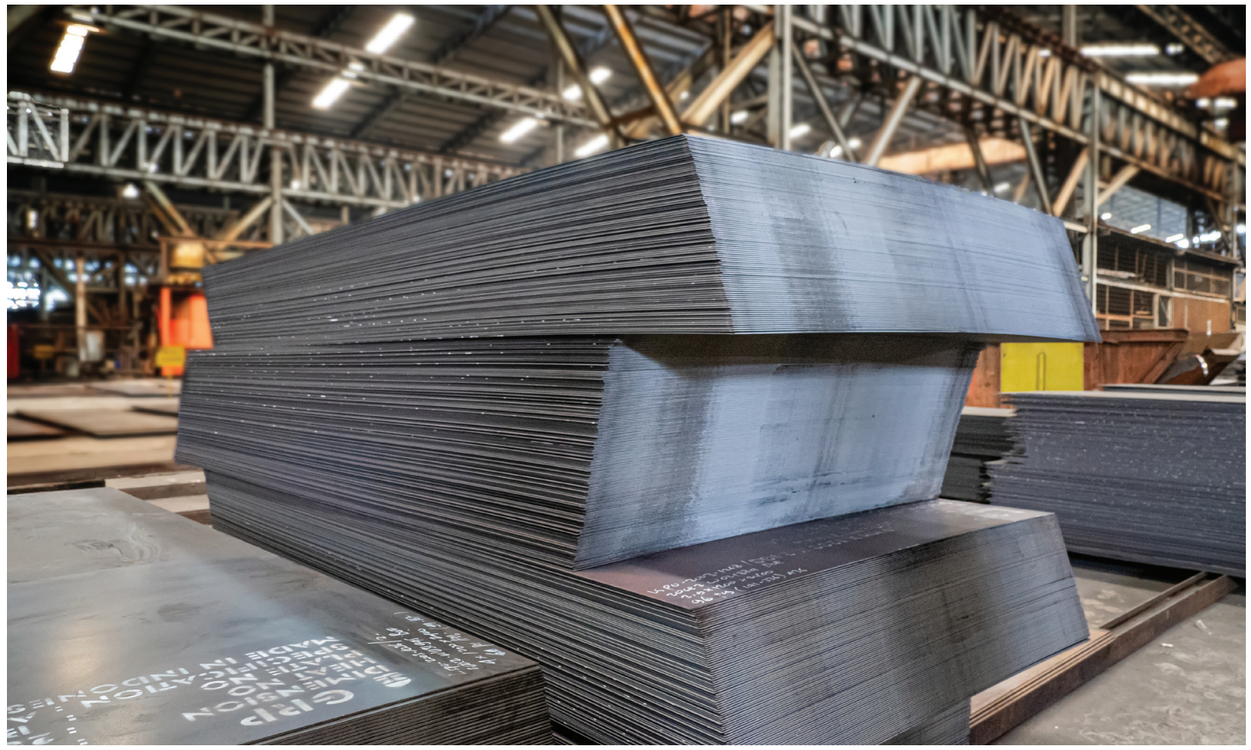
Notes:
1. Impact tests for Grade A are not required when the material is produced using fine grain practice and normalized.
2. Impact test can be done with min thickness 6 mm.
3. Subsize impact test requirement will be applied for Thickness ≤10 mm.

UN CPC code

41211 - Flat-Rolled Products of Non-Alloy Steel, Not Further Worked than Hot-Rolled, of a Width of 600 mm or More

Geographical Scope

Manufactured in Indonesia, supplied to Indonesia and United Arab Emirates



LCA information

Declared unit

1 tonne of hot rolled coil and sheet

Reference service life

Not applicable

Time representativeness

specific data for the manufacturing collected from 2021-11-01 to 2022-10-31. The 10-year age requirement for generic data has been met.

Database(s) and LCA software used

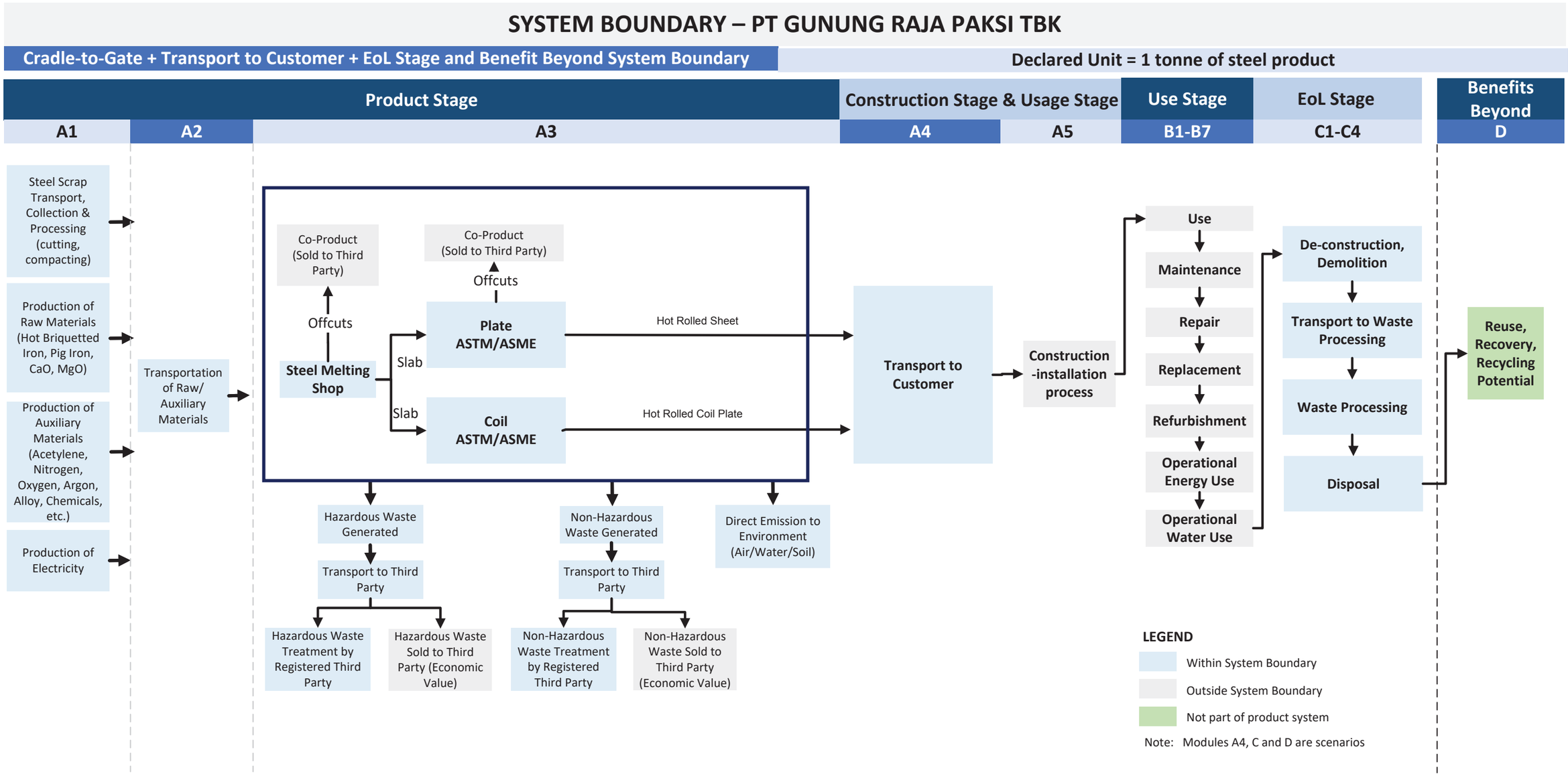
generic data for upstream and downstream processes use Ecoinvent 3.8 database and modelled by using SimaPro Developer software version 9.4.0.2. No datasets older than 10 years were used.

Description of system boundaries

The system boundary was chosen based on the goal and scope of the study and in accordance with EN 15804:2012+A2:2019, i.e. “cradle-to-gate” with the end of life stage as well as benefits and loads beyond the system boundary (module A1-A4, C1-C4, D). Modules A5 and B1-B7 have not been included due to the inability to predict how the material will be used in the construction process and use stage. The processes below are included in the product system to be studied:

1. **Upstream (A1-A2)**
   a. Steel Scrap collection & processing
   b. Production of raw materials (Hot Briquetted Iron, Pig Iron, CaO, MgO)
   c. Production of auxiliary materials in the form of solid, liquid or gas (e.g. Alloy, Chemicals, Electrode, Acetylene, Argon, Nitrogen, Oxygen, LNG, etc.)
   d. Production of electricity from electricity mix in Indonesia from Ecoinvent Database
   e. Transportation of raw/auxiliary materials from the supplier to manufacturing plant
2. **Core (A3)**
   a. Steel Melting Shop (SMS): Electric Arc Furnace, Ladle Furnace, Tundish, Continuous Casting Machine, Cutting, Marking, Scarfing
   b. Plate & Steckel Mill (PSM): Reheating Furnace, Descale (Primary & Secondary), Roughing Mill, Steckel Furnace, Steckel Mill, Finishing Mill, Laminar Cooling, Up Coiler, Hot Leveler, Cooling Bed, Normalizing, AUT Machine, Shot Blasting & Painting, Inspection & Repair, Cooling, Equalizer, Cutting Process (Hot & Cold/Cold), Marking, Storage
   c. Clarifier (vessel)
   d. Dust collector & blower
   e. Waste treatment (slag, skull, scrap, welding wire, electrode, grinding disc, etc.)
   f. Hazardous waste generated and waste treatment in the registered third party
   g. Non-hazardous waste generated that sold to the third party
   h. Direct emission to the environment
3. **Downstream (A4, C1-C4, D)**
   a. Transport to the building/construction site
   b. Deconstruction & Demolition
   c. Transport to waste processing unit
   d. Waste processing for the scrap steel
   e. Disposal
   f. Reuse/Recovery/Recycling of the end of life of the products

System diagram



More information

Relevant websites for more information regarding the process in manufacturing:
www.gunungrajapaksi.com

Key Assumptions and Limitations

- Production process of materials in upstream process taken from Ecoinvent database reflects average or generic production and therefore does not correspond to actual suppliers.
- Any differences in composition of steel grades within the grade groups is generally considered insignificant compared to the overall results (with a variation of no more than 10%). Sensitivity analysis was conducted to justify the assumption.
- Land use change emissions in module A3 were considered immaterial. The plant is in an industrial zone which was established in 1990 (more than 30 years ago).
- The water consumption was counted from the amount of makeup water to compensate the losses due to water evaporation.

Cut-off rules

In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module, e.g. per module A1-A3, C1-C4 and module D shall be a maximum of 5 % of energy usage and mass. In this study, all data in the product system is included. If there is missing specific data, generic data from the database or literature will be used.

Data Quality

- Time related coverage: specific data were collected from 2021-11-01 to 2022-10-31, and generic data are representative of the year 2021.
- Geographic coverage: specific data were collected from area under study, i.e., West Java, Indonesia. Generic data were collected from global average data.
- Technological coverage: specific data were collected from current steel making process under study. Generic data from global average with technology aspects were similar with what described in the process under study, but merits improvement as processes were not modelled with specific data.

Data quality for both specific and generic data were sufficient to conduct life cycle assessment in accordance with the defined goal and scope.

Allocation

Economic allocation was applied in accordance with EN 15804:2012+A2:2019. Allocation was applied to allocate the main product and the steel scrap coming out the manufacturing i.e., cutting scale and mill scale. For the end-of-life of waste generated in the manufacturing process (e.g., slag), polluter pays principle are applied for each type of waste. This means that GRP will carry the full environmental impact until the end-of-waste state is reached.

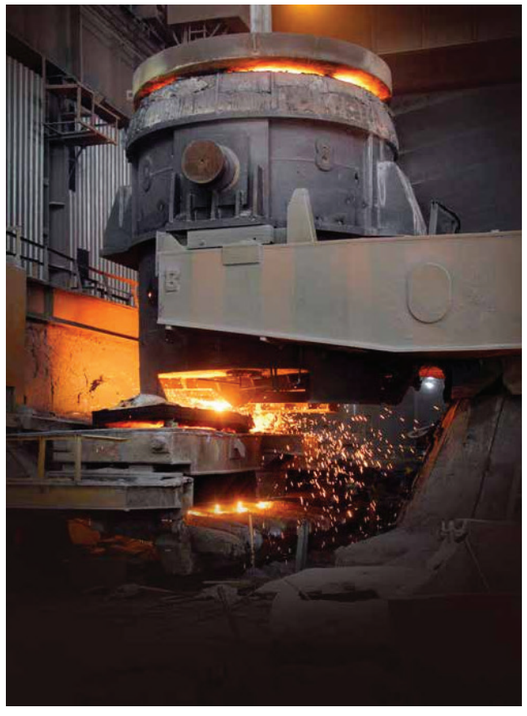
Multi-input allocation is relevant for any material sent to landfill, i.e. steel scrap and also waste generated in the manufacturing. The emissions to air and soil (from leaching) are determined based on the physical/chemical composition of the inputs or physical properties of the material going to landfill. As a result, steel products or other waste generated (paint container, used spray paint containers , penetrant, etc.) that end up in landfill only contribute to those emissions that are likely to occur based on the input material. Overhead processes associated with landfill (e.g. energy used in equipment for managing the landfill site) are attributed to waste flows based on their mass. Mass allocation is considered a reasonable estimation for attributing overhead processes to various waste flows. This allocation is applied as well for any material sent to incineration, i.e. contaminated gloves and rags

In this study, the closed-loop process is applied between modules A-C and module D . When the scrap is used in the manufacture of a new product, there is an allocation (or debit) associated with the scrap input. Meanwhile the recovered steel scrap for recycling is allocated a credit (or benefit) associated with the avoided impacts of the virgin material. If the amount of recovered steel scrap for recycling is less than what the product system requires/steel scrap needed in the manufacture, then the environmental burdens associated with meeting the raw material demand are included in this closed-loop model. If, however, the amount of recovered steel scrap for recycling is larger than what the product system requires/ steel scrap needed in the manufacture, then the product system receives a net credit, equivalent to the net amount of virgin material avoided.

The recovered steel scrap that is not looped back to the manufacture (leaving product system that have passed the end-of-waste state), goes to module D, except those which have been allocated as co-product. The end-of-waste state of the steel scrap is reached when the steel scrap is processed in the waste processing (Module C3). The steel scrap is sorted and pressed into blocks and ready to be used for other specific purposes. After the point of end-of-waste, the downstream emissions related to transportation process from recycler to manufacture is attributed to the processing unit that uses the secondary material.

The impacts assigned to the credit or burden that comes from module D are calculated by adding impact connected to secondary steel production from EAF plant (beyond system boundary) and subtracting the impacts resulting from primary steel production at BOS plant. The difference between 100% primary steel production (BOS plant) and 100% secondary steel production (EAF plant) is the result of the module D. The calculation is following worldsteel methodology of steel scrap.

The benefit beyond system boundary (module D) is a credit estimation resulted from the system because in real-life there is a trans-continent boundary of the market in United Arab Emirates and producers in Indonesia which do not share the recycled material market. The assessed products are exported to United Arab Emirates. Therefore, the recovery rate for recycling is adjusted to the rate in each country, i.e., 10% United Arab Emirates and 15% in Indonesia. The unrecyled steel scrap is considered as material losses that will go to another disposal scenario to landfill.



LCA Scenarios and Additional Technical Information

- Electricity grid in module A3 was based on Ecoinvent database for Indonesia that was modified to represent JAMALI (Java-Madura-Bali) electricity network. The composition of electricity mixed for JAMALI and the amount of electricity losses were adjusted based on Statistic from Directorate General of Electricity (2019) which is highly reliant on coal (66%), gas fired (27.5%), hydropower (4%), geothermal (2%), and diesel (<1%). The climate impact of the electricity is 1.2 kg CO2 eq./ kWh.
- The 'Resource depletion – water' (RDW) indicator requires water scarcity data for the production areas, and these were modelled using the specific watershed scarcity data for Bekasi, West Java, i.e., 0.4m3/m3 for the characterisation factor.
- For module beyond A3, the scenarios included are currently in use and are representative for one of the most probable alternatives.
- Pig iron was sent to GRP in solid form from the supplier in India. Therefore, the global Ecoinvent database was modified by using available India Ecoinvent databases. This modification was applied as well for Hot briquetted iron (HBI) that was imported from supplier in Singapore.
- Transportation using truck in Indonesia use EURO3 to represent the current condition. Meanwhile in Singapore, EURO5 is used as a standard emission.
- Transport distance was estimated by Google Maps from GRP to Indonesia's Port (47 km), and Indonesia's Port to destination port (United Arab Emirates = 6 534 km).
- Transportation in Singapore were estimated based on Singaporean statistic for average rigid truck travelled 229 kilometres a day (2003).
- Transportation in Indonesia were estimated based on statistic for average truck travelled 300 kilometres a day (2021).
- Amount of diesel used for demolition process was modelled using Ecoinvent database for global data, i.e., 0.626 MJ diesel/kg steel.
- Amount of diesel and electricity consumption for waste processing was modelled using Ecoinvent database for global data on sorting and pressing iron scrap, i.e., 0.1 MJ diesel/kg steel and 0.01 kWh/kg steel.
- Electricity was modelled using Ecoinvent database for Indonesia and Singapore.
- The steel recycling rate in Indonesia is 15% according to the Ministry of National Development Planning of

- the Republic of Indonesia (2021). Average recycling rate for steel is 99% in Singapore according to The National Environment Agency (2021).
- GRP uses external scrap in its steel production. Net scrap was calculated by excluding the amount of internal scrap (home scrap). The potential environmental benefit calculated for the end-of-life stage (Module D) was based on the net amount of scrap left in the system in accordance with “value of scrap” worldsteel methodology.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construc-tion process stage		Use stage							End of life stage				Resource re-covery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	ID, IN, SG, GLO	ID	ID	ID, AE	-	-	-	-	-	-	-	-	ID, AE	ID, AE	ID, AE	ID, AE	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	ID, AE	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	ID, AE	-	-	-	-
Variation – sites	Not Relevant			-	-	-	-	-	-	-	-	-	ID, AE	-	-	-	-

X: Declared

ND : Not declared

Content declaration

Hot rolled coil and sheet ASTM/ASME that manufactured by GRP is made of low alloy steels with pig iron and approximately 70.39% scrap-based material. GRP followed the chemical range of ASTM/ASME as per the specifications that mentioned above, therefore, the average chemical composition can be seen below.

Product content	Weight, %				
Iron (virgin sources)	Approx. 29.61%				
Recycled material (Post-consumer material)	Approx. 70.39%				
Chemical composition, %	**ASTM A283/ ASME SA283 Gr.C**	**ASTM A285/ ASME SA285 Gr. A, B, C.**	**ASTM A36/ ASME SA 36**	**ASTM A131/ ASME SA131 Gr. A, B, D, E**	**ASTM A131/ ASME SA131 Gr. AH/DH/ EH 32**
Carbon (C)	0.09 - 0.21	0.09 - 0.20	0.09 - 0.21	0.12 – 0.20	0.15 – 0.22
Silica (Si)	0.20 – 0.30	0.20 – 0.30	0.20 – 0.30	0.10 – 0.30	0.25 – 0.35
Manganese (Mn)	0.025 – 0.75	0.025 – 0.75	0.025 – 0.75	0.55 – 0.75	1.20 – 1.60
Phosporus (P)	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.015
Sulphur (S)	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.010
Chemical composition, %	**ASTM A573/ ASME SA 573 Gr. 70**	**ASTM A588/ ASME SA588 Gr. B**	**ASTM A242/ ASME SA242**	**ASTM A516/ASME SA516 Gr. 55, 60,65,70**	
Carbon (C)	0.17 – 0.20	0.12 – 0.15	0.12 – 0.15	0.12 – 0.20	
Silica (Si)	0.20 – 0.35	0.20 – 0.30	0.20 – 0.30	0.20 – 0.30	
Manganese (Mn)	1.15 – 1.25	1.20 – 1.30	0.80 – 0.90	0.60 – 1.25	
Phosporus (P)	≤ 0.015	≤ 0.015	≤ 0.015	≤ 0.02	
Sulphur (S)	≤ 0.010	≤ 0.010	≤ 0.010	≤ 0.02	
Packaging materials					
No packaging used for the products					
Dangerous substances from the candidate list of SVHC for Authorisation					
No dangerous substances					

Environmental performance

The estimated impact results provided in this EPD report are solely relative statements and do not serve as indicators of the end points of the impact categories, surpassing threshold values, safety margins, or risks. The result presented in this document is an weighted average value of multiple products, covering hot rolled coil ASTM/ASME and hot rolled sheet ASTM/ASME.

Potential environmental impact – mandatory indicators according to EN 15804:2012+A2:2019

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Impact Indicator	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1 882.67	201.08	53.77	41.56	20.43	37.47	581.75
GWP-biogenic	kg CO_2 eq.	10.92	0.14	0.04	0.03	0.10	0.03	6.92
GWP-luluc	kg CO_2 eq.	2.12	1.54E-03	1.34E-03	3.11E-04	0.02	3.37E-04	0.10
GWP-total	kg CO_2 eq.	1 895.70	201.22	53.81	41.59	20.55	37.51	588.77
ODP	kg CFC 11 eq.	1.08E-04	4.77E-05	1.20E-05	9.86E-06	2.21E-06	8.83E-06	1.90E-05
AP	mol H^+ eq.	9.33	1.01	0.58	0.15	0.15	0.15	1.51
EP-freshwater	kg P eq.	0.23	9.24E-05	3.77E-05	1.90E-05	2.21E-03	2.38E-05	2.00E-03
EP-marine	kg N eq.	2.10	0.35	0.26	0.05	0.05	0.05	-0.05
EP-terrestrial	mol N eq.	23.21	3.82	2.85	0.51	0.59	0.54	2.78
POCP	kg NMVOC eq.	5.92	0.93	0.68	0.13	0.16	0.13	1.34
ADP-minerals & metals[2]	kg Sb eq.	3.80E-04	9.05E-06	2.78E-06	1.90E-06	4.11E-06	1.71E-06	0.01
ADP-fossil[2]	MJ	23 671.58	2 853.26	744.32	588.95	237.11	529.19	4 951.67
WDP[2]	m^3	3.67	-1.58E-03	5.09E-03	-2.08E-04	0.02	1.08E-04	221.50

Acronyms

- **GWP-fossil** : Global Warming Potential fossil fuels
- **GWP-biogenic** : Global Warming Potential biogenic
- **GWP-luluc** : Global Warming Potential land use and land use change
- **ODP** : Depletion potential of the stratospheric ozone layer
- **AP** : Acidification potential, Accumulated Exceedance
- **EP-freshwater**: Eutrophication potential, fraction of nutrients reaching freshwater end compartment
- **EP-marine** : Eutrophication potential, fraction of nutrients reaching marine end compartment
- **EP-terrestrial** : Eutrophication potential, Accumulated Exceedance
- **POCP** : Formation potential of tropospheric ozone
- **ADP-minerals&metals** : Abiotic depletion potential for non-fossil resources
- **ADP-fossil** : Abiotic depletion for fossil resources potential
- **WDP** : Water (user) deprivation potential, deprivation-weighted water consumption

[1]The impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potentioal ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator

[2]The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

Potential environmental impact – additional environmental information according to EN 15804:2012+A2:2019

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Impact Indicator	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidence	1.18E-04	1.51E-05	1.56E-05	2.71E-06	3.35E-06	2.89E-06	3.09E-05
IRP[1]	kBq U235 eq.	19.01	12.35	3.24	2.55	0.56	2.29	2.67
ETP-fw[2]	CTUe	16 931.70	1 161.77	248.29	240.82	64.04	219.15	16 911.49
HTP-c[2]	CTUh	2.45E-06	3.22E-08	3.23E-09	3.34E-09	2.09E-09	3.02E-09	-5.06E-06
HTP-nc[2]	CTUh	1.89E-05	2.04E-06	2.54E-07	3.89E-07	1.37E-07	3.52E-07	-2.95E-05
SQP[2]	dimensionless	838.80	7.44	2.34	1.54	1.05	36.36	1 273.87

Acronyms

- **PM**: Particulate Matter emissions
- **IRP**: Ionizing radiation - human health
- **ETP-fw**: Eco-toxicity – freshwater
- **HTP-c**: Human toxicity - cancer effects
- **HTP-nc**: Human toxicity - non-cancer effects
- **SQP**: Land use related impacts / soil quality

Resource use indicators

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Indicator	**Unit**	**Total A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	621.11	3.34	1.19	0.69	0.69	0.70	613.67
PERM	MJ	0	0	0	0	0	0	0
PERT	MJ	621.11	3.34	1.19	0.69	0.69	0.70	613.67
PENRE	MJ	25 960.41	3 029.33	790.29	625.29	625.29	561.84	5 172.90
PENRM	MJ	0	0	0	0	0	0	0
PENRT	MJ	25 960.41	3 029.33	790.29	625.29	625.29	561.84	5 172.90
SM	kg	710	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3	74.42	0.77	0.19	0.16	0.16	0.14	-1.98

Acronyms

- **PERE** : Use of renewable primary energy excluding renewable primary energy resources used as raw materials
- **PERM** : Use of renewable primary energy resources used as raw materials
- **PERT** : Total use of renewable primary energy resources
- **PENRE** : Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials
- **PENRM** : Use of non-renewable primary energy resources used as raw materials
- **PENRT** : Total use of non-renewable primary energy re-sources
- **SM** : Use of secondary material
- **RSF** : Use of renewable secondary fuels
- **NRSF** : Use of non-renewable secondary fuels
- **FW** : Use of net fresh water

Waste production and output flows

Waste production

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	6.22	0	0.32	0	0.05	0	-56.23
Non-hazardous waste disposed	kg	107.66	0	0	0	0	850	-3.77
Radioactive waste disposed	kg	1.44E-04	0	0	0	0	0	0

Output flow indicators

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Parameter	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0
Material for recycling	kg	0	0	0	0	150	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0

Potential environmental impact – environmental information according to EN 15804:2012+A1:2013

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Impact Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
GWP	kg CO_2 eq.	1 843.74	199.69	53.22	41.28	20.30	37.18	518.47
ODP	kg CFC 11 eq.	8.77E-05	3.77E-05	9.51E-06	7.79E-06	1.75E-06	6.97E-06	2.66E-05
AP	kg SO_2 eq.	7.56E+00	7.63E-01	4.12E-01	1.12E-01	1.16E-01	1.11E-01	1.26E+00
EP	kg PO_4^{3-} eq.	1.42E+00	1.19E-01	8.78E-02	1.63E-02	2.54E-02	1.71E-02	-2.39E-02
POCP	kg C_2H_4 eq.	3.34E-01	2.34E-02	8.09E-03	4.07E-03	9.38E-03	4.08E-03	4.47E-01
ADPE	kg Sb eq.	3.81E-04	9.06E-06	2.78E-06	1.90E-06	4.11E-06	1.72E-06	1.18E-02
ADPF	MJ	31 275.50	2 785.68	727.26	575.00	286.09	517.22	7 320.51

Climate impact (GWP-GHG) – according to PCR

Results per 1 tonne of Hot Rolled Coil & Sheet ASTM/ASME								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	1 864.64	199.90	53.30	41.30	20.36	37.22	543.30

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

Interpretation of results

- Module A1-A3 contributes significantly to the impact generated by the whole life cycle.
- The electricity production process is the largest contributor to majority of the potential impacts followed by sponge iron production.
- From the production activities carried out in the GRP area (module A3), the emission to air in the reheating furnace appears as a hotspot for human toxicity potential (non-carcinogenic) due to emissions such as mercury and arsenic.
- Sensitivity analysis was conducted for different electricity consumption in Electric Arc Furnace SMS. The results show insignificant changes with average overall variation is no more than 20%. Therefore, the results are representative.

Environmental Initiatives

PT Gunung Raja Paksi Tbk cooperates with Institut Pertanian Bogor (IPB) or Bogor Agricultural University, are managing 7 green areas at GRP covering the employee mess area and the environment around the production area. This cooperation intends to reduce CO2 and maintain good and healthy air quality in those areas. PT Gunung Raja Paksi Tbk (GRP) officially signed a cooperation agreement with the Sharingyuk Community from Institut Pertanian Bogor (IPB) in September 2021.

The company is committed to support the Government program towards green industry that recognized for ten years in a row by the PROPER certificate awarded by the Republic of Indonesia's Ministry of Environment and Forestry. Aspects of the assessment include environmental permits, water pollution control, air pollution control and management of hazardous and toxic waste.

PT Gunung Raja Paksi Tbk has been obtained ISO 14001:2015 – Environmental Management System certificate. Every 6 months, PT Gunung Raja Paksi Tbk conduct environmental monitoring, such as measuring ground water, air, chimney emission, etc for reporting to UKL-UPL (Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan).

PT. Gunung Raja Paksi is increasingly determined and committed to continuous improvement for sustainable living. In terms of the use of renewable resources, PT. Gunung Raja Paksi has collaborated with Total Energies on the installation of the first phase of the 700 Kwp solar power plant (PLTS) in 2022 and further plans to build a Phase 2 Rooftop PLTS of 6,480 Kwp and Phase 3 of 12,800 Kwp. All the power generated is channeled and used for production support activities. The Company continues to strive to control greenhouse gas emissions that cause global climate change, including through implementing solar panels supported by advanced and modern technology. The Company's efforts to reduce energy and emissions are a form of the Company's commitment to preserving the environment.

PT Gunung Raja Paksi Tbk (GRP) became Indonesia's first and one of Asia's first steel mills to purchase carbon credits. The carbon credits were purchased through Gunung Capital from Climate Impact X (CIX) as much as 10 000 tonnes of carbon credits in October 2021. The carbon credits were purchased from eight recognised Natural Climate Solution (NCS) projects at USD 8.00 per tonne. The NCS projects are global selection of quality projects with high environmental and social impact that spanning reforestation and avoided deforestation initiatives – across Africa, Asia and Latin America – demonstrate the high-performance of carbon sequestration and high levels of verified co-benefits, such as supporting biodiversity, along with social and economic development in local communities.

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Southeast Asia EPD

Environmental Product Declaration

SHAPING TOMORROW

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