Verified Carbon Standard

CHENGZI RECYCLED AL PROJECT A

Document Prepared by Guangdong Shuangtanda Technology Co., Ltd.

Project title	**Chengzi Recycled Al Project A**
Project ID	--
Monitoring period	1-Mar-2022 to 31-Jul-2023
Crediting period	1-Mar-2022 to 28-Feb-2029
Original date of issue	27-Sep-2023
Most recent date of issue	25-Oct-2023
Version	1.2
***VCS Standard* Version**	4.5
Prepared by	Guangdong Shuangtanda Technology Co., Ltd.

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1   PROJECT DETAILS

1.1   Summary Description of the Project

Chengzi Recycled Al Project A (hereinafter called "the Project") aims to produce recycled aluminium from aluminium waste products (e.g., window frames, aluminium cans, etc.) sourced from the MSW and to replace primary aluminium produced from raw materials. The Project located in Group 6, Lotus Village, Chengguan Town, Fang County, Shiyan City, Hubei Province, China and is developed and operated by Hubei Chengzi Aluminum Industry Co., Ltd. and Zhonghe Carbon Sink Science and Technology Research (Wuhan) Co., Ltd. (hereinafter called "The Project Proponent").

Prior to the project, pure aluminium was extracted from the aluminium ore obtained from the mining of aluminium mines by means of an electrolytic cell, which was the basic scheme of the project. Therefore, the GHG emission reduction will be generated through the implementation of the project by avoiding the consumption of the equivalent raw materials and reducing related energy consumption as well. The project has started constructed since May 2021, and the date of production line putting into operation is March 2022.

The project activity will reduce GHG in the atmosphere through an avoiding extraction of raw materials and production of virgin materials. It is estimated that the project will result a total of 410,627 tCO_2e emission reductions in the first crediting period of 7 years and with annual average of 58,661 tCO_2e emission reduction in the 1st crediting period.

1.2   Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation/ verification	/	VCS	CTI Certification Co., Ltd	/

1.3   Sectoral Scope and Project Type

Sectoral scope	13
Project activity type	Waste handling and disposal

The project is not AFOLU project and is not a grouped project.

1.4   Project Eligibility

1.4.1   General eligibility

As per section 2.1.1 of VCS Standard (version 4.5), the scope of the VCS Program includes:

1) The six Kyoto Protocol greenhouse gases: The emission reduction of the Project mainly comes from: recycled aluminium produced (using scrap aluminium) rather than primary aluminium from the electrolysis of bauxite.

2) Ozone-depleting substances: Not Applicable.

3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process: Not Applicable.

4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval: The applied methodology AMS.III.AJ (Version 9.0) of the project are methodologies approved under CDM Program, which is a VCS approved GHG program.

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements: Not Applicable.

The project activity aims to produce recycled aluminium from aluminium waste products (e.g., window frames, aluminium cans, etc.) sourced from the MSW, which has not generated GHG emissions primarily for the subsequent reduction removal or destruction. And the project is not belonged to the projects excluded in Table 1 of VCS Standard 4.5. Thus, the project is eligible under the scope of VCS program.

1.4.2 AFOLU project eligibility

The project is not AFOLU project and is not a grouped project.

1.4.3 Transfer project eligibility

This project is not a transfer project.

1.5 Project Design

☒ Single location or installation

☐ Multiple locations or project activity instances (but not a grouped project)

☐ Grouped project

Grouped Project Design

The Project is not a grouped project, this section is not applicable.

1.6 Project Proponent

Organization name	Hubei Chengzi Aluminum Industry Co., Ltd.
Contact person	Xiuhua Zheng
Title	Manager
Address	Group 6, Lotus Village, Chengguan Town, Shiyan City, Hubei Province, China
Telephone	13872116888
Email	50767558@qq.com

Organization name	Zhonghe Carbon Sink Science and Technology Research (Wuhan) Co., Ltd.
Contact person	Taotao Shan
Title	Manager
Address	No. 6, Townsend Hubei Road, East Lake New Technology Development Zone, Wuhan City, Hubei Province, China
Telephone	+86 13907172013
Email	yangshuqing@zhthkx.com

1.7 Other Entities Involved in the Project

Organization name	Jike Enterprise Consulting (Wuhan) Co., Ltd.
Role in the project	Project Consultant
Contact person	Shuqing Yang
Title	Manager
Address	No.26, Binhu Road, East Lake New Technology Development Zone, Wuhan, China
Telephone	+86 17771807580
Email	zhonhetanhui@163.com

Organization name	Guangdong Shuangtanda Technology Co., Ltd.
Role in the project	Project Consultant
Contact person	Fulin Mao
Title	Manager
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Telephone	+86 17322218846
Email	flmao@gdstdkj.com

1.8   Ownership

All interests in this project are owned by Hubei Chengzi Aluminum Industry Co., Ltd.. The business license of Hubei Chengzi Aluminum Industry Co., Ltd. is the evidence for right of use. The approval of Environmental Impact Assessment (EIA) report is the evidence for legislative right. Accordingly, J Hubei Chengzi Aluminum Industry Co., Ltd. shall have the sole right to distribute and utilize the VCUs generated from the Project. According to the cooperation agreement, Hubei Chengzi Aluminum Industry Co., Ltd. entrusted Zhonghe Carbon Sink Science and Technology Research (Wuhan) Co., Ltd. to be responsible for all matters during the registration process of the project. Therefore, Zhonghe Carbon Sink Science and Technology Research (Wuhan) Co., Ltd. has the right to manage and operate the project.

1.9   Project Start Date

Project start date	1-Mar-2022
Justification	The project has started constructed since 05/2021, and the date of production line putting into operation is 03/2022. Therefore, the start of this project is set for March 1, 2022.

1.10   Project Crediting Period

Crediting period	☒ *Seven years, twice renewable*
	☐ *Ten years, fixed*

	☐ *Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)*
Start and end date of first or fixed crediting period	1-Mar-2022 to 28-Feb-2029

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

☒ < 300,000 tCO2e/year (project)

☐ ≥ 300,000 tCO2e/year (large project)

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO$_2$e)
01-Mar-2022 to 31-Dec-2022	48,884
01-Jan-2023 to 31-Dec-2023	58,661
01-Jan-2024 to 31-Dec-2024	58,661
01-Jan-2025 to 31-Dec-2025	58,661
01-Jan-2026 to 31-Dec-2026	58,661
01-Jan-2027 to 31-Dec-2027	58,661
01-Jan-2028 to 31-Dec-2028	58,661
01-Jan-2029 to 28-Feb-2029	9,777
Total estimated ERRs during the first or fixed crediting period	410,627
Total number of years	7
Average annual ERRs	58,661

1.12 Description of the Project Activity

The project activity is to ensure the quality of the product, the plant will recycle the waste aluminium product instead of using the raw material to produce aluminium. Therefore, the GHG emission reduction will be generated through the implementation of the project by

avoiding the consumption of the equivalent raw materials and reducing related energy consumption as well.

In the baseline scenario, the cryolite-alumina molten salt electrolysis process is widely used, and its main production equipment is aluminum reduction cell. The chemical reaction is the reaction of alumina and carbon to produce liquid aluminum and carbon dioxide. In this chemical reaction, molten cryolite is the solvent, alumina is dissolved as the solute, and carbon materials are used as the cathode and anode. After a strong direct current is applied, an electrochemical reaction occurs at the two poles, and the product on the cathode is liquid aluminum, and the product on the anode is gas such as carbon dioxide. The purpose of the direct current: on the one hand, it is to use its heat energy to melt the cryolite into a molten state and maintain a constant electrolytic temperature; Another aspect is to achieve electrochemical reactions.

Because a large amount of direct current is needed in the process of aluminum production by electrolytic aluminum method, the power consumption is very large.

The project is owned by the Hubei Chengzi Aluminum Industry Co., Ltd., the Project will recycle 14,500 tons waste aluminium per year. The average annual emission reduction is 58,661 tons CO_2e.

The existing scenario prior to the implementation of the project is the product being produced by using the raw material, and the baseline scenario of the project is the same as the existing scenario.

Technology description

The project installs a range of product equipment and systems aimed at the recycling of scrap aluminium, with no chemical reactions involved in the production process and only a small amount of off-gas and wastewater. Electricity for production is provided by Central China Power Generation (CCG).

The project production processes are shown in the Figure 1-1, and the main production technologies are described in below paragraph:
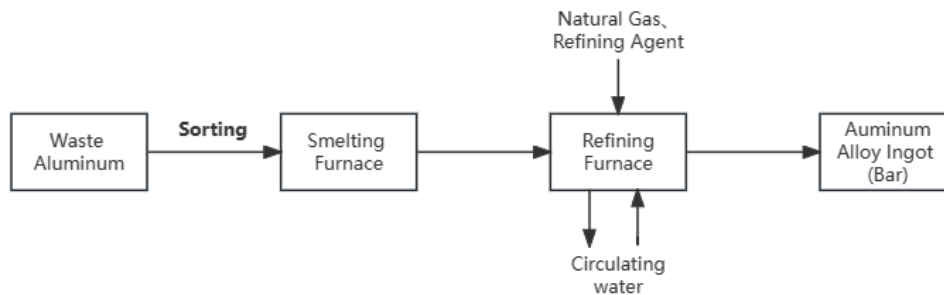

Figure 1-1 Project production processes

(1) Sorting

Although the raw materials purchased for the project are clean scrap aluminum, it is difficult to ensure that the purchased clean scrap aluminum will not be mixed with other wastes, such as obvious plastics, rubber and other metals. In order to ensure the cleanliness of the waste aluminum entering the furnace and reduce the generation of pollutants during the smelting process, the waste aluminum purchased by the project shall be sorted before entering the furnace to sort out the impurities that may be mixed.

(2) Process stage in smelting furnace

① Smelting stage: according to the data provided by the construction unit, the single feeding amount of each furnace of single smelting furnace is more than 80 t, and the single production capacity of each furnace can reach 80 t/batch.

The project adopts regenerative double-chamber reflex smelting furnace, which is divided into heating chamber and waste chamber. The main function of the heating chamber is to provide the main energy for smelting.

② Stir and scrape slag

The melting process and melting speed have important influence on the quality of aluminum ingot. When the charge is heated to soften and the melting liquid level of the charge is horizontal, the melt shall be stirred properly to make the temperature uniform, accelerate the heat transfer of aluminum liquid and improve the thermal efficiency, so as to accelerate the slag floating to the melt surface to form slag (aluminum ash). The aluminum ash shall be raked out in time and sent back to the converter for aluminum recovery, and shall be removed by raking car.

(3) Process stage in refining furnace

Each smelting furnace of the Project is connected with a refining furnace. The smelting furnace and the refining furnace are designed with height difference and launder connection. The molten aluminum in the smelting furnace enters the refining furnace (low furnace) through the launder. refining, quenching and tempering the aluminum liquid in a refining furnace according to the analysis result and the target product brand after sampling and analysis. the refine furnace burns natural gas through a regenerative burn, that temperature of a molten bath is kept between 600 and 800 DEG C, and the temperature of a hearth is kept between 800 and 1000 DEG C.

①Impurity removal and degassing: in the melting furnace, high temperature aluminum liquid will react with water vapor in the air to generate aluminum oxide and hydrogen, and there is a small amount of impurities in the aluminum liquid. The refining process is mainly to remove impurities and gas from molten aluminum by adding refining agent and inert gas. The refining agent impurity removal process is adopted in this project.

② Quality adjustment: in the process of refining, the aluminum liquid is quickly analyzed before the furnace, and then the ingredients are adjusted according to the requirements of the product alloy grade and the analysis results, such as adding silicon metal, copper and other auxiliary materials, until the sampling and analysis components are qualified.

③Slag skimming of refining furnace

In that refine process, a certain amount of slag float on the surface is produced by smelting with a flux, the slag has a protective effect on the melt, However, too much scum will affect the heat transfer, so the scum should be raked out regularly

④Stand still

After refining, tempering and slagging, the aluminum liquid was placed in the regenerative double-chamber reverberatory furnace (refining) for about 20min and then cast made.

(4) Ingot (bar)

After the aluminum liquid sample is detected to be qualified, the aluminum liquid is put into a casting machine through a chute, and is cooled and formed. The ingot casting (bar) is carried out on a mechanized ingot casting machine (or bar casting machine) at a rate of 2.5s/ingot (bar), and the aluminum alloy ingot (bar) is naturally cooled and then shrunk and self-demoulded without using a release agent. The cooled aluminum ingot (bar) is conveyed to the automatic robot by the conveyor belt for stacking ingot (bar) to obtain aluminum alloy ingot (bar) with good surface quality.

(5) The stacking ingot (rod) sets the operating procedure of the mechanical device, and automatically stacks the aluminum ingot or aluminum rod according to a certain amount of ingot.

(6) Aluminum ash recovery

The process flow of aluminum ash recovery of the Project is "ash stirring-cold ash-screening".

①Fried ash

The aluminum slag generated in the slagging process of the smelting and refining procedures is put into a closed aluminum slag hopper, and is transported to a rotary kiln for recycling treatment by a forklift while being hot, and the metal aluminum is recycled by adding a slagging agent into the rotary kiln.

②Cold ash

After the aluminum ash slag after cooling treatment in the aluminum ingot casting workshop is screened by a screening machine for the first time, and the fine ash of 60 mesh (0.42mm) grade is screened out, and then the medium particles below φ12mm and the coarse particles

above φ 12mm are sorted out, wherein the coarse particle aluminum ash slag returns to the smelting furnace to recover metal aluminum, and the medium particles become small particle ash slag after secondary screening.inum ash slag which cannot be recovered is removed from the rotary furnace by a slag scraper.

The kiln door is scraped out and put into the sealed aluminum slag hopper, and poured into the charging port of the ash cooler (also called ash cooler barrel) for cooling.

③Screening

The aluminum ash slag after cooling treatment in the aluminum ingot casting workshop is screened by a screening machine for the first time, and the fine ash of 60 mesh (0.42mm) grade is screened out, and then the medium particles below φ12mm and the coarse particles above φ 12mm are sorted out, wherein the coarse particle aluminum ash slag returns to the smelting furnace to recover metal aluminum, and the medium particles become small particle ash slag after secondary screening.

(7) Circulating water and cooling water system

The ingot casting (bar) machine and the ash cooler supporting the ash cooler shall be cooled by circulating cooling water.

1.13 Project Location

The project is located in Group 6, Lotus Village, Chengguan Town, Fang County, Shiyan City, Hubei Province, China.The specific location is 32° 05′ 34″ N, 110° 42′ 19″ E.

Figure 1-2: Project Location for Project Activity

Figure 1-3: Boundary of Facility for Project Activity

1.14 Conditions Prior to Project Initiation

Prior to the project, pure aluminium was extracted from the aluminium ore obtained from the mining of aluminium mines by means of an electrolytic cell, which was the basic scheme of the project. The condition prior is the same as the baseline scenario, please refer to the Section 3.4.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

Environmental Protection Law of the People's Republic of China[1]

Environmental Impact Assessment Law of the People's Republic of China[2]

Law of the People's Republic of China on the Prevention and Control of Water Pollution[3]

Air Pollution Prevention and Control Law of the People's Republic of China[4]

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[1] https://flk.npc.gov.cn/detail2.html?MmM5MDlmZGQ2NzhiZjE3OTAxNjc4YmY3NmMxZDA3MTc%3D

[2] https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE2ZjEzNWY0NjAxNmYyMGU4OWVmZjE3MGE%3D

[3] https://flk.npc.gov.cn/detail2.html?MmM5MDlmZGQ2NzhiZjE3OTAxNjc4YmY4NTA0NTA5ZmI%3D

[4] https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE2ZjEzNWY0NjAxNmYxY2QzNzgzNjExNTU%3D

Law of the People's Republic of China on prevention and Control of Noise Pollution[5]

Law of the People's Republic of China on the Prevention and Control of Environmental Pollutionby Solid Waste[6]

Law of the People's Republic of China on the Prevention and Control of Soil Pollution[7]

Regulations on safety Administration of Hazardous Chemicals[8]

Regulations on the Administration of Environmental Protection of Construction Projects[9]

VOCs pollution prevention and control technology policy[10]

Measures for the Administration of Recycling of Renewable Resources (Ministry of Commerce Decree No. 8 of 2007)[11]

Identification standards for solid wastes General rules[12]

Classified Management Catalogue of Environmental Impact Assessment of Construction Projects[13]

Regulations on Prevention and Control of Air Pollution in Hubei Province[14]

Regulations on the Prevention and Control of Water Pollution in Hubei Province[15]

1.16   Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

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[5] https://flk.npc.gov.cn/detail2.html?ZmY4MDgxODE3ZGVhOWMxODAxN2RlYjcwZGRjNzAxMzE%3D

[6] https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE3MjljNjVkODAxNzI5ZDQ1NWZhZDA0YmU%3D

[7] https://flk.npc.gov.cn/detail2.html?MmM5MDlmZGQ2NzhiZjE3OTAxNjc4YmY4YmIxMTBiOGI%3D

[8] https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE2ZjNjYmIzYzAxNmY0MDg3Y2RjYzAzZDk%3D

[9] https://flk.npc.gov.cn/detail2.html?ZmY4MDgwODE2ZjNjYmIzYzAxNmY0MGYzN2JhMzBkYTc%3D

[10] https://www.mee.gov.cn/ywgz/fgbz/bz/bzwb/wrfzjszc/201306/t20130603_253125.shtml

[11] http://www.mofcom.gov.cn/dl/file/20211203230625.pdf

[12] http://std.samr.gov.cn/gb/search/gbDetailed?id=71F772D81D4FD3A7E05397BE0A0AB82A

[13] http://www.mee.gov.cn/ywgz/fgbz/guizhang/201805/t20180502_435786.shtml

[14]

http://www.yx.gov.cn/zfxxgk/dfbmptlj/zfgzjg/xcsglzfj/zc_18598/zfwj_11074/202305/t20230529_1018175.html?eqid=bfdb21750002c3ea00000006648d73cb

[15] https://flk.npc.gov.cn/detail2.html?ZmY4MDgxODE3ZmQ5ODU5YjAxODA2M2JlZGUwMDFiYTk

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.18 Sustainable Development Contributions

1.18.1 Sustainable Development Contributions Activity Description

The project will contribute to sustainable development on a local and national level in the following ways:
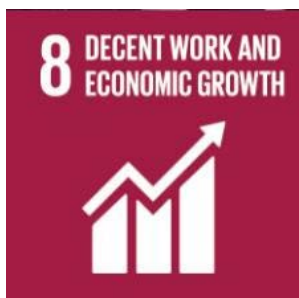
• **Goal 8 Decent Work and Economic Growth**: "Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all": The project activity will need manpower to operation, management and maintenance, which will directly increase the employment opportunities for local resident or for migrant workers. This contributes to one of the China's actions or promoting sustainable developing, "Fully implement the policy of Employment Priority, and promote more productive and high-quality employment through multiple channels".

• **Goal 12 Responsible consumption and Production**: "Ensure sustainable consumption and production patterns": The project activity produce recycled aluminium from aluminium waste products (e.g., window frames, aluminium cans, etc.) sourced from the MSW and to replace primary aluminium produced from raw materials, to reduce the related energy consumption, MSW (Municipal Solid Waste) disposal and accumulation. This contributes to one of China's actions for promoting sustainable developing, "achieve carbon peaks in 2030, and achieve carbon neutralization before 2060, accelerating the establishment and improvement of green low- carbon circulation economic systems, and promoting the comprehensive green transformation of economic and social development".

• **Goal 13 Climate Action**: "Take urgent action to combat climate change and its impacts": GHG emission reductions will be generated through the implementation of the project activity by avoiding the consumption of the equivalent raw materials and reducing related electricity and fossil fuel consumption. This contributes to achieve one of China's stated sustainable development priorities "Promote the implementation of the national strategy to actively respond to climate change and achieve the carbon intensity reduction target ahead of schedule".

1.18.2 Sustainable Development Contributions Activity Monitoring

During this monitoring period, the Project recycled 29,053 tons of waste aluminium from MSW, achieving emission reductions of 94,293 tCO_2e. At the same time, the project has created at least 69 jobs. Refer to Table 1.2 below for quantified sustainable development contributions. The evidence of the Project's SD contribution 8.3 has been provided to the VVB for verification and is not provided as appendices to this report due to confidentiality issues. The evidence of the Project's SD contributions 12.5 and 13.0 is included in this Joint PD&MR.

Table 1-2: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1)	8.3	Number of longterm jobs provided[16]	Implemented activities to decrease	At least 69 jobs were provided to local villagers during the monitoring period.	From 1-3-2022 to 31-7-2023, the project has provided least 69 jobs for local villagers.
2)	12.5	Tons of material recycled	Implemented activities to decrease	During this monitoring period, the Project recycled 29,053 tons of waste aluminium.	The project has recycled 21,794 tons of waste aluminium.
3)	13.0	Tons of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project achieved a GHG emission reduction of 94,293 tCO_2e during this monitoring period.	From 1-3-2022 to 31-7-2023, the project has achieved a GHG emission reductions of 84,226 tCO_2e.

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[16] There is no official SDG indicator applicable; a self-defined indicator is hence applied.

1.19 Additional Information Relevant to the Project

Leakage Management

According to applied CDM methodology AMS-III.AJ. (Version09.0) and VCS methodology VMR0007 (Version01.0), leakage is not considered.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

No further information is required.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification	The Hubei Chengzi Aluminum Industry Co., Ltd. has been identified as the project activity area. Moreover, it will be directly affected by the project activity. Therefore, all employees (men and women) of Hubei Chengzi Aluminum Industry Co., Ltd., neighbouring residents and local authorities should be identified as stakeholders.
Legal or customary tenure/access rights	To be provided with an environment and working conditions that ensure the minimum conditions of well-being. To be trained on issues related to the development of project activities. To express opinions on the direct and indirect impact of the project on the interests of the community.

Stakeholder diversity and changes over time	According to the survey, the number of ethnic minorities in the area is very small, so there is no social, economic or cultural diversity.
Expected changes in well-being	Compared to the baseline scenario, the project activity increases the behaviour of recycling waste aluminium, which is equivalent to providing stakeholders with a working channel for recycling waste aluminium. At the same time the project activity produces recycled aluminium by recovering waste aluminium from the environment, which is equivalent to improving the ecological environment and providing a better living environment for stakeholders.
Location of stakeholders	Group 6, Lotus Village, Chengguan Town, Fang County, Shiyan City, Hubei Province, China
Location of resources	Group 6, Lotus Village, Chengguan Town, Fang County, Shiyan City, Hubei Province, China

2.1.2   Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	3-Jun-2021
Stakeholder engagement process	On June 3, 2021, stakeholder representatives gathered in the meeting room of the project proponents to participate in the questionnaire survey; on the other hand, the project proponents visited the communities near the project sites from June 1, 2021 to June 2, 2021 and distributed printed questionnaires directly to the local personnel and workers.
Consultation outcome	The survey showed that the project has strong local support among the local people. They all believe that the project will boost the local economy and agree with its construction. Based on all the comments and suggestions received, all stakeholders are in favour of the construction of the proposed project. Local people believe that the limited impacts caused by the proposed project would be negligible if the project proponents strictly adhere to the environmental impact assessment report.

Ongoing communication	The project owner has a dedicated project partnership specialist to ensure ongoing communication with the stakeholders and to address any issues that may arise. All stakeholder input will be categorized and considered throughout the entire life cycle of the project. Management will also make adjustments accordingly. During the course of the project, project proponents will maintain direct communication with community members and relevant stakeholders through their on-site project staff. This will establish a commitment to communication and consultation to keep stakeholders informed of project activities, including restoration, maintenance, monitoring, and verification processes. On-site project staff will maintain regular (usually quarterly) communication with other stakeholders through face-to-face meetings. In addition, project staff will actively listen to suggestions from any identified community members or other stakeholder groups and report them to the project proponents in a timely manner. The project owner will address feedback in a timely manner and will publicize options and results.
Stakeholder input	Prior to the implementation of the project, the project proponents conducted environmental science on recycled aluminum to stakeholders such as the employees of the plant and the neighbourhood. They also said that local residents can also send their collected waste aluminum to the project proponents, who will process them into recycled aluminum products for their use free of charge according to their needs.

2.1.3   Free Prior and Informed Consent

Obtaining consent	At the stakeholder meeting on June 3, 2021, the project proponents, together with stakeholder representatives, developed a transparency protocol with the aim of better monitoring and informing stakeholders about project activities. And all issues and conflicts were resolved on the same day.
Outcome of FPIC	Stakeholder meetings gathered opinions from different representatives about the project design and their participation willingness. The results showed that all stakeholders agreed to the development of the project.

	Transparency protocol means that all information related to the project activities will be called to the stakeholder representatives in the first instance and posted on the notice boards in the neighborhood. The stakeholder representatives then open a stakeholder meeting to disseminate the new information and obtain proposals from the stakeholders.
	Provide assurance that the project has not encroached on land, relocated people without consent, and forced physical or economic displacement.

2.1.4 Grievance Redress Procedure

Development process	The project owner develops a feedback grievance program in consultation with all stakeholders through meetings, which establishes a clear feedback and grievance redress process to resolve disputes with stakeholders that may arise during the planning, development and implementation of the project.
	If a conflict of interest exists between parties, stakeholders can appeal to the project owner, either through a representative or directly, which is the most effective way to resolve the issue. They appeal through the phone number of the relevant contact person or raise it during the meeting. The project owner will contact and discuss with the relevant community or other stakeholders within 3 days. Specific staff should propose a solution and mediation plan within one week based
	on all information gathered by the parties involved, and the conflict should be dealt with within 30 days.
Grievance redress procedure	If a dispute arises, the following steps will be taken to resolve it:
	1. The project owner will work with the representative to actively communicate with the stakeholders to find a solution. Once an agreement is reached, a paper response document will be co-signed and each party will retain a copy. The dispute should be resolved within 30 days.
	2. If the problem cannot be resolved by the representative and the project proponent themselves, the government will need to step in and coordinate for them.

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Grievances received	Resolution and outcome
No complaints received	Active response

2.1.5 Public Comments

Comments received	Actions taken
No public comments received	Project proponent will take due account of any and all comments received during the consultation. PP will be either update the proiect design or demonstrate the insignificance or irrelevance of the comment, and demonstrate to the validation/verification body what action it has taken.

2.2 Risks to Stakeholders and the Environment

	Risks identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk identified	Stakeholder engagement has a positive impact on project activities and is risk free.
Working conditions	No risk identified	The working environment is in an aluminum production plant, all of which is semi-automated. Workers only need to sort and transport aluminium and check whether the equipment is functioning properly, and the working conditions are not harsh.
Safety of women and girls	No risk identified	In accordance with article 21 of the Law of the People's Republic of China on the Protection of Rights and Interests of Women, women's rights to life, body and health are inviolable. Abuse, abandonment, mutilation, sale and other acts that infringe on women's right to life and health are prohibited. Article 22: The abduction, trafficking and kidnapping of women; the buying of women who have been abducted, trafficked or kidnapped; and the obstruction of the rescue of women who have been abducted, trafficked or kidnapped are prohibited. Article 23 prohibits sexual harassment of women against their will

		by means of speech, writing, images or physical acts. Local governments regulate these offenses and provide penalties for offenders and protection for victims.
Safety of minority and marginalized groups, including children	No risk identified	In order to safeguard the security of ethnic minorities and marginalized groups, including children, the Government has enacted a series of laws and regulations. The following are some of the main ones: 1. The Constitution of the People's Republic of China provides that: "The State shall safeguard the lawful rights and interests of all ethnic minorities, and maintain and develop harmonious relations of equality, solidarity and mutual assistance among all ethnic groups. 2. The Criminal Law of the People's Republic of China stipulates: "Anyone who has been subjected to criminal punishment or unlawfully arrested, detained, imprisoned, or institutionalized for education on account of ethnicity, religion, or other issues, and who has become the prime mover of a criminal suspect or an active participant in the crime, may be given a lighter or less severe punishment. 3. The Law of the People's Republic of China on the Protection of Minors stipulates that. "The State, society, schools and families shall strengthen education on minors' health knowledge and improve minors' awareness and ability to protect themselves." 4. The Law of the People's Republic of China on the Prevention of Juvenile Delinquency stipulates that: "Parents or other guardians of minors and schools shall educate minors not to engage in the following undesirable behaviors: (a) absenteeism from school, staying out at night, (b) carrying control knives, (c) fighting and insulting others, (d) forcibly demanding property from others, (e) stealing or intentionally destroying property. (vi)

		participating in gambling or gambling in disguise, (vii) watching or listening to pornographic or obscene audio-visual products or reading materials, (viii) entering places such as commercial dance halls, which laws and regulations stipulate that minors are not fit to enter, and (ix) other malpractices that are seriously contrary to social morality. These laws and regulations provide strong legal support for safeguarding the security of ethnic minorities and marginalized groups. Local governments regulate these offenses and provide penalties for offenders and protection for victims.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	Risk identified	The project activity has a special sewage treatment system, and the EIA report can prove that the pollutants discharged from the project meet the standards set by law.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	The Chinese Government has always attached great importance to anti-discrimination and anti-sexual harassment legislation, and has taken a series of measures to strengthen the formulation and implementation of relevant laws and regulations. First, the Constitution of the People's Republic of China clearly stipulates citizens' rights to personal freedom, equality and democracy, providing legal safeguards against discrimination and sexual harassment. Second, the Chinese Government has also enacted the Law of the People's Republic of China on the Protection of the Rights and Interests of Women, the Law of the People's Republic of China on the Protection of Minors, and the Law of the People's Republic of China on the Protection of the Rights and Interests of the Elderly, in order to protect the rights and interests of different groups of people in the areas of employment, education and medical care. In addition, the Chinese Government has introduced corresponding regulations and policies in specific areas, such as

	the Regulations on Personnel Management in Public Institutions, the Special Regulations on the Labor Protection of Female Workers and Employees, and the Opinions of the Ministry of Human Resources and Social Security and the Ministry of Education on the Establishment of a System of Exchange and Rotation of Teachers in Primary and Secondary Schools and Kindergartens. Finally, the Chinese Government is also actively carrying out publicity, education and training activities to raise public awareness and consciousness of anti-discrimination and sexual harassment. In short, China's anti-discrimination and anti-sexual harassment legislation and policies and measures are constantly being developed and improved, laying a solid foundation for promoting social justice and safeguarding people's legitimate rights and interests. The project does not engage in this behavior. Local governments regulate these offenses and provide penalties for offenders and protection for victims.
Management experience	Workers hired for this project activity are only responsible for the most basic tasks (sorting, transport, etc.) and no relevant experience is required. All other management positions are held by engineers with engineer's documents.
Gender equity in labor and work	(1) Equal pay for men and women for equal work. The Constitution stipulates that the State protects the rights and interests of women and that men and women receive equal pay for equal work. The Law on the Protection of Rights and Interests of Women stipulates that men and women are equal in the allocation of housing and the enjoyment of welfare benefits. (2) Men and women are equal in employment, and enterprises may not discriminate against women when recruiting. The Law on the Protection of Rights and Interests of Women provides that the State guarantees that women enjoy equal labor rights with men. When recruiting workers, except for types of work or positions that are not suitable for women, enterprises may not refuse to recruit women or raise the recruitment standards for women on the basis of their gender. According to the Regulations on the Labor Protection of Female Workers and Employees, no unit that is suitable for women to perform labor shall refuse to recruit female workers. They may not reduce a female worker's basic salary or terminate her labor contract during her pregnancy, childbirth, or breastfeeding period.

	(3) It is prohibited to arrange for female workers to engage in high-intensity labor. The Law on the Protection of Rights and Interests of Women stipulates that: any unit shall, in accordance with the characteristics of women and in accordance with the law, protect the safety and health of women at work and in the course of their labor, and shall not make arrangements for work and labor that are unsuitable for women. According to and: it is prohibited to arrange for female workers to engage in underground work in mines, work of the fourth level of physical labor intensity as prescribed by the State, and other work that is taboo to engage in. (4) According to the Provisions on the Scope of Taboo Labor for Female Workers: it is prohibited to arrange for women to engage in underground work in mines, logging, fluting and exile work in the forest industry, work of the fourth level of physical labor intensity in the standards of the Grading of Physical Labor Intensity, assembly and dismantling of scaffolding in the construction industry, and work of overhead wiring in the electric power and telecommunication industries; and to carry continuous loads (referring to the number of times of carrying loads of more than six times an hour) exceeding 20 kilograms each time, and intermittent loads exceeding 20 kilograms each time, and interrupted loads exceeding 20 kilograms each time. 20 kilograms, and intermittent weight-bearing operations of more than 25 kilograms per load. Local governments regulate these offenses and provide penalties for offenders and protection for victims.
Human trafficking, forced labor, and child labor	The penalty for child labor under China's Child Labor Prohibition Regulations is a fine and financial compensation for the child's guardian. Article 240 of the Criminal Law. Anyone who abducts or traffics women or children shall be sentenced to fixed-term imprisonment of not less than five years and not more than 10 years and shall be fined. Where the circumstances are particularly serious, the penalty is death and confiscation of property. Therefore, there will be no trafficking of women and children and no child labor in this project. Local governments regulate these offenses and provide penalties for offenders and protection for victims.

2.3.2 Human Rights

All the actions of the stakeholder meeting are decided by a democratic vote of the stakeholders. All information is open and transparent. If there is any violation of human rights

treaties such as gender discrimination, racial discrimination, child labor, actually disabled people, etc. in this project, the local governments will immediately step in and take protective measures, and the local governments is also a stakeholder.

2.3.3 Indigenous Peoples and Cultural Heritage

There is no indigenous presence at the project site.

The project activity does not damage cultural heritage as such.

2.3.4 Property Rights

Rights to territories and resources	**Inapplicable.**
Respect for property rights	Inapplicable.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	At a stakeholder meeting, stakeholders work together to develop a benefit-sharing agreement and provide input on the benefit-sharing agreement, then stakeholders vote on those inputs, and finally the voted benefit-sharing agreement is publicized.
Summary of the benefit sharing plan	The VCUs registered and issued by the project organizers and developers for the development of the project will be transferred to the stakeholder's shared account.
Approval and dissemination of benefit sharing plan	The approval process is conducted through a democratic vote at a stakeholder meeting, and the Benefit Sharing Plan approval process and specific plans are posted on bulletin boards in village government, street offices, and other places to publicize the process.
Benefit sharing during the monitoring period	The VCUs registered and issued by the project organizers and developers for the development of the project will be transferred to the stakeholder's shared account.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure taken
Impacts on biodiversity and ecosystems	No risk identified	The project is located on the outskirts of the city.
*S*oil degradation and soil erosion	risk identified	The project has a dedicated sewerage line, which will not affect water consumption and stress. The EIA report can prove.
Water consumption and stress	risk identified	Solid waste discharged from the project will be disposed of centrally in landfills. The EIA report can prove.
Usage of fertilizers	No risk identified	Inapplicable.

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes ☒ No

2.4.2 Introduction of species

Not applicable, no species will be cited by the project

2.4.3 Ecosystem conversion

Not applicable, project does not involve ecosystems

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	AMS-III.AJ.	Recovery and recycling of materials from solid wastes	9.0
Methodology	VMR0007	Recovery and recycling of materials from solid wastes	1.0

TOOL	TOOL07	Tool to calculate the emission factor for an electricity system	7.0
TOOL	TOOL03	Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion	3.0
TOOL	TOOL21	Demonstration of additionality of small-scale project activities	13.1

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
AMS-III.AJ.	1. Case A: Project activities that target the participation of the informal waste sector 2. Case B: Greenfield facility and/or capacity addition to existing facilities with formal sector participation	According to the definition in the CDM methodology: AMS-III.AJ. The formal waste sector is: "solid waste management activities planned, sponsored, financed, carried out or regulated and/or recognized by the local authorities or their agents, usually through contracts, licenses or concessions." And the informal waste sectors are "individuals or a group of individuals who are involved in waste management activities but are not formally registered or formally responsible for providing the waste management services. Newly established formalized organizations of such individuals, that is cooperatives, can also be considered as the informal sector for the purpose of this methodology." After checking the project proponent background, reviewing the public information, the project factory is not planned, sponsored, financed,

			carried out nor regulated and/or recognized by the local authorities or their agents. The project is run by individual, who is not formal sector. Therefore, the project belongs Case A.
	3.	In Case A, the recycling facility is operated by the informal sector. The recycling facility may also receive wastes collected by the formal waste sector (e.g. public collection system). Waste fractions that were already being recycled in the baseline by enterprises in the formal sector cannot be included in the calculations.	Applicable, the recycling facility is operated by the informal sector who only purchases the waste aluminum collected by private parties, andthe recycling facility does not receive wastes collected by the formal waste sector.
	4.	The recycling facility may be an existing facility, or a newly implemented facility.	The recycling equipment and production lines are all newly built.
	5.	It is possible to directly measure and record the final output of the recycling facility, that is the weight of materials leaving the recycling facility (on a dry basis), segregated by type.	Applicable, the Project is equipped with wagon balance for measuring the final output of the recycling facility, that is the weight of materials leaving the recycling facility (on a dry basis).
	6.	Each type of recycled material is sold directly to a processing/manufacturing facility, or to a chain of intermediary retailers that are able to transfer the materials to final identifiable processing/manufacturing	Applicable, the produced aluminum is sold directly to downstream processing plants, which process these aluminum into final products.

	facilities that process the segregated fractions.	
	7. The Project Design Document (PDD) shall explain the procedures such as contractual agreements proposed to eliminate double counting of emission reductions, for example due to the formal waste sector or the processing/manufacturing facility, or other parties possibly claiming credits for emission reductions. Similarly, through contractual agreement and other means such as survey/analysis undertaken by a third party, credible proof shall be provided to show that the materials supplied from the recycling facility are used for processing/manufacturing and not for other purposes such as a source of fuel or disposal.	Applicable, the Project proponent can provide the relative evidence and contractual agreements to prove that all the waste aluminum was purchased from the companies or the individual, there is no formal waste sector involved. The project proponent will purchase the waste aluminum from the waste sector and produce the recycled aluminum. The sales invoice provided by the project proponent can prove that the recycled aluminum produced from the project proponent facility are sold to downstream processing plants. According to the historical records provided by downstream processing plants, all the purchased aluminum were used for manufacturing, not for fuel source or disposal. Project supporters are located in their own industrial parks from the purchase of waste aluminum to the production of recycled aluminum that can be directly used as raw materials for the final product, so there are no other abatement parties. As described in Section 1.16.1, this project activity is not included the mandatory emission control scheme and there is no emission cap enforced for the Project Proponent according to the enforced company list in public information. Hence, it is confirmed that the emission

			reductions will not be double counted.
	8.	Emission reductions can be claimed for the difference in energy use for the production of materials from virgin inputs versus production from recycled material. In the case of paper or cardboards, emission reductions due to the avoidance of methane formation in anaerobic decay may be claimed if the baseline scenario is the waste disposal in a disposal site without methane recovery.	Applicable, the Project's emission reduction can be claimed for the difference in energy use.
	9.	In any of the above cases the project proponent shall be able to demonstrate, using three years historic data (market data, official statistics etc.) prior to the start date of the project activity, that the finished products (HDPE, LDPE, PET PVC, PP, steel aluminum, paper and cardboard and glass) were manufactured in the host country of the CDM project using either virgin raw materials produced in country or virgin raw materials imported from another non-Annex I country. This analysis may be limited to only those finished products where recycled materials have proven to be a technically viable option, that is those types of products that are	No applicable, Since it is not possible to obtain accurate information on whether the original raw materials used in the production of the final product were domestic or imported, a conservative estimate is used and the portion of imported raw materials should be corrected in accordance with the requirements of paragraph 25 of the AMS-III. AJ methodology.

	expected to be the end products produced from materials recycled as part of the project activity.	
	10. As an alternative to the requirement stipulated in paragraph 8 above, the project proponents may choose to adjust the baseline emissions by using the baseline correction factor (B) as described under the baseline section below.	Applicable, because through the demonstration mentioned above, the project should be corrected in accordance with the requirements of paragraph 25 of the AMS-III. AJ methodology.
	11. The recycling facility sha source its materials from MSW: materials from an unknow source are not eligible under this methodology. The project activity consists of separation of the recyclables from bulk MSW by means of manual or magnetic or mechanical separations. If the project activity involves the collection of wastes on a door to door basis or collection at recipient's containers for the voluntary dispensing of wastes by the noncommunity, all recyclables (paper, plastics, glass, etc.) processed by the recycling plant shall be collected together, selective collection of metals or any other wastes is excluded As a consequence, wastes not pertaining to the identified baseline waste collection and destination stream that would	Applicable, the waste aluminum are collected by supplier from the waste yard. The supplier will classify and simply dispose of the collected waste aluminum, and then package and send it out. The project proponent will sign the contract with the supplier to demonstrate that the waste aluminum transporting to the recycling facility are from MSW. The incoming materials for this project activity are purchased only from suppliers and there is no door-to-door collection, etc.

	not be delivered to the baseline disposal site and/or treatment plant (e.g. incineration) are not eligible.	
	12. In the specific case of metals, the methodology excludes collection of the wastes generated from the production process of primary/ secondary/ finished metal and materials or in the processing of the finished metal and materials into final products, and it covers only postconsumer obsolete wastes. Project proponents shall provide evidence that the materials recycled under the project activity are recovered only from end-of-life-wastes and project activity does not divert waste from any historically existing informal or formal recycling activity.	Applicable, this project recycles waste cans, which are used after consumption.
	13. The amount of fuel and electricity consumed by the recycling facility can be measured and recorded.	Applicable, the project proponent has installed the meter in the facility to measure the consumption of electricity, and the project proponent has reserved the natural gas purchase invoice during the crediting period. Therefore, the amount of the fuel and electricity consumed by the recycling facility can be measured and recorded.
	14. Project proponents shall demonstrate that the properties of the materials produced from waste recycling are the same as	Applicable, the recycled aluminium of this project will add silicon, copper and other auxiliary materials to adjust the alloy composition during the recycling process in order

	those from virgin materials. For example, if the waste materials such as recycled plastic bottles are converted into building blocks or roof tiles the emission reductions based on displacement of original virgin materials cannot be claimed under this methodology. For recycled materials, project proponents shall provide documentation proving that the properties of the materials produced are comparable according to standard testing methods for each material.	to meet the demand for ductility during processing and the characteristics of the final product. The quality inspection sheet passes the laboratory test.
	15. Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 ktCO2 equivalent annually.	Applicable, the project annual emission reduction is 58,615 tCO_2 which is less than 60 $ktCO_2$.

Through the analysis above, the methodology AMS-III.AJ.: Recovery and recycling of materials from solid wastes (Version 09.0) is applicable to the project.

According to the description of Additionality in Methodology VMR0007, Section 7, "Additionality must be demonstrated following the procedure provided in the latest version of AMS-III.AJ.", therefore additionality has already been demonstrated for Methodology AMS-III.AJ. and does not need to be demonstrated again.

TOOL03: tool to calculate project or leakage CO_2 emissions from fossil fuel combustion	It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties.	Applicable, the Project fossil fuel consumption will be recorded regularly, both the quantity and name of fossil fuel will be recorded. During the project production activity, the fossil fuel consumed is

		natural gas, and the combustion process of natural gas is the provide hot water for the cleaning line.
TOOL07: Tool to calculate the emission factor for an electricity system	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid.	Applicable, the project activity aims to save the electricity consumed by using the waste aluminum as raw material to re-produce the product instead of using the crude oil and nature gas.
	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants.	Applicable, the Project electricity system is only nation grid.
	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	Applicable, the value applied to the emission factor of biofuels is zero.
TOOL21: demonstration of additionality of small-scale project activities	The use of the methodological tool "Demonstration of additionality of small-scale project activities" is not mandatory for project participants when proposing new methodologies. Project participants and coordinating/managing entities may propose alternative methods to demonstrate additionality for consideration by the Executive Board.	According to the methodology AMS-III.AJ. Version 09.0, this tool should be used to demonstrate the additionality of project activity. The project's aggregate size is less than SSC thresholds($60ktCO_2e/y$), and the project's technology isn't comprised of any technologies from the positive listed in the TOOL32. The project's

		aggregate size is smaller than MSC thresholds ($20ktCO_2e/y$), and the project activity does not meet the conditions of Tool 19 Section 5.13. As per the Appendix, "provisions of small-size and microscale tools for automatic additionality" in TOOL21, with such aggregate size, the project will use the regular additionality procedure as stated in the TOOL21.
	Project participants and coordinating/ managing entities may also apply "TOOL19: Demonstration of additionality of microscale project activities" as applicable.	Not applicable, as demonstrated above, the project's aggregate size is smaller than MSC thresholds ($20ktCO_2e/y$), and the project activity does not meet the conditions of Tool 19 Section 5.13. Therefore, the TOOL19 is not applicable, and the project proponent would apply the TOOL21 to demonstrate the additionality.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Electricity Consumption	CO_2	Y	Main emission source
		CH_4	N	Minor emission source
		N_2O	N	Minor emission source
		Other	N	Minor emission source

Source		Gas	Included?	Justification/Explanation
Project	Fuel Consumption	CO_2	Y	Main emission source
		CH_4	N	Minor emission source
		N_2O	N	Minor emission source
		Other	N	Minor emission source
	Electricity Consumption	CO_2	Y	Main emission source
		CH_4	N	Minor emission source
		N_2O	N	Minor emission source
		Other	N	Minor emission source
	Natural gas Consumption	CO_2	Y	Main emission source
		CH_4	N	Minor emission source
		N_2O	N	Minor emission source
		Other	N	Minor emission source

According to the methodology, the project boundary includes the physical geographical sites of:

(a) Waste collection sites

(b) The recycling facility.

(c) Processing/manufacturing facility

(d) Virgin material production

(e) MSW disposal site or treatment plant in the baseline scenario.

The transport by truck of the input and output material is not included in the project boundary.

The following are the project boundaries.

Figure 1-4 presents the project boundary.

3.4   Baseline Scenario

The identified credible alternatives are:

a.   The implementation of project activity without VCS and produce recycled aluminium from aluminium waste products (e.g., window frames, aluminium cans, etc.) sourced from the MSW and to replace primary aluminium produced from raw materials.

b.   As a continuation of the current business-as-usual scenario, aluminium products will be produced through the electrolysis of mined aluminium ore using large amounts of electricity.

For the alternative (a), the project will face the investment barrier, please refer to the Section 3.5 below, and for the alternative (b), it is the current common situation, there is no barrier. Therefore, the baseline scenario would be alternative (b), the aluminium is produced through the electrolysis of mined aluminium ore using large amounts of electricity.

3.5   Additionality

3.5.1   Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐   Annex 1 country   ☒   Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes ☒ No

3.5.2 Additionality Methods

The additionality of the project is demonstrated as per the TOOL21 "Demonstration of additionality of small-scale project activities" required by the Methodology.

The project's aggregate size is less than SSC thresholds (60k tCO2e/y), and the project's technology isn't comprised of any technologies from the positive listed in the TOOL32. The project's aggregate size is smaller than MSC thresholds (20k tCO2e/y), and the project activity does not meet the conditions of Tool 19 Section 5.13. As per the Appendix，"provisions of small-size and microscale tools for automatic additionality" in TOOL21, with such aggregate size, the project will use the regular additionality procedure as stated in the TOOL21.

According to the TOOL21, project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

a. Investment barrier: a financially more viable alternative to the project activity would have led to higher emissions.

b. Technological barrier: a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions.

c. Barrier due to prevailing practice: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions.

d. Other barriers: without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.

The project activity would not have occurred anyway due to investment barrier. The investment barrier is demonstrated as below.

● **Investment barrier**

c. There are 2 identified alternatives mentioned in the Section 3.4, the alternative (b) is the continuation of current business-as-usual scenario, that the aluminium products would be produced through the electrolysis of mined aluminium ore using large amounts of electricity, which does not involve an investment from the project participants and therefore no investment analysis is required for this scenario.

The alternative (a) is the implementation of project activity without VCS, produces recycled aluminium from aluminium waste products (e.g., window frames, aluminium cans, etc.). As

the project generates financial and economic benefits other than VCS related income through the sales of aluminium. A Benchmark Analysis was chosen and conducted for investment analysis of alternative (a) and the financial indicator - IRR, was chosen. The project belongs to "Smelting of metals and their alloys" in the "Smelting of metals and their alloys". According to the table[17] of values of financial base rate of return for construction projects in the "Methods and Parameters for Economic Evaluation of Construction Projects" issued by the National Development and Reform Commission and the Ministry of Construction, the financial base rate of return (after tax) for this project is 12%. Thus, 12% is adopted as the benchmark of Equity IRR.

According to the income statement and annual tax return of Hubei Chengzi Aluminium Industry Co., Ltd., the company is currently in a loss-making position and therefore the project activity cannot be considered financially attractive.

Therefore, according to TOOL21 "Demonstration of additionality of small-scale project activities", the project activity would not have occurred anyway due to investment barrier, therefore, the project can be demonstrated as additional.

3.6 Methodology Deviations

The project does not involve any methodology deviation.

4 IMPLEMENTATION STATUS

4.1 Implementation Status of the Project Activity

The project factory has started operation since 1-Mar-2022, During the first monitoring period (from 1-Mar-2022 to 31-Jul-2023), all product lines in the project factory were operating normally, there was neither events nor accident occurred that might impact the GHG emission reduction and monitoring.

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[17] https://www.ndrc.gov.cn/fggz/gdzctz/tzfg/201907/t20190729_1197578.html

5 QUANTIFICATION OF ESTIMATED GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology, the baseline emission include:

a. For the production of plastic, the emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials.

b. For paper and cardboard, the emissions associated with the anaerobic decay within a disposal site may be claimed.

c. For the production of glass, emissions associated with the energy consumption for the production of virgin container glass corresponding to the preparation and mixing of raw materials before the melting stage.

d. For the production of metals, emissions associated with energy consumption for the production from virgin materials.

Baseline emission shall be determined as:

$$BE_y = BE_{plastic,y} + BE_{glass,y} + BE_{paper,y} + BE_{metal,y} \tag{1}$$

Where:

BE_y = Baseline emission in year y (tCO$_2$e)

$BE_{plastic,y}$ = Baseline emissions associated with the recycling of plastic in year y (tCO$_2$e)

$BE_{glass,y}$ = Baseline emissions associated with the recycling of glass in year y (tCO$_2$e)

$BE_{paper,y}$ = Baseline emissions associated with the recycling of paper in year y (tCO$_2$e)

$BE_{metal,y}$ = Baseline emissions associated with the recycling of metal in year y (tCO$_2$e)

The project only recycled and fabricated the aluminium, the baseline emissions associated with the other materials are equal to 0, therefore:

$$BE_y = BE_{metal,\ y} \tag{2}$$

As per the methodology, the baseline emission for metal recycling is calculated through:

$$BE_{metal,y} = \Sigma_i\, Q_i \times B_i \times SE_i \times (1 - DF) \tag{3}$$

Where:

$BE_{plastic,y}$	=	Baseline emissions in year y associated with the recycling of plastic (tCO_2e)
i	=	Metal type i (i = 5, 6 for Steel and Aluminium)
$Q_{i,y}$	=	Quantity of metal type i (Steel or Aluminium) recycled and sent to a processing or manufacturing facility in year y (t)
B_i	=	Correction factor based on share of production in non-Annex I countries
SE_i	=	Specific CO_2 emission factor for production of metal i (tCO_2/t)
DF	=	Discount factor for upstream displacement (30%)

The specific CO_2 emission factors are indicated in below. These values shall be updated at each renewal of the crediting period, in accordance with the latest version of the methodology.

Table 4-1 Specific CO2 emission factor for production of metals

Metal	SEi (tCO_2/t)
Aluminium	8.40

Only the baseline emissions which would take place in non-Annex I countries shall be credited. Therefore, in cases where the requirements set out in paragraph 8 of methodology AMS-III.AJ cannot be fulfilled, the baseline emissions calculated for the total amount of recycled materials obtained in the project activity are adjusted by a correction factor *Bi*, calculated as the ratio of the production of the material *"i"* in non-Annex I countries and the total production of this material in the world. See the Table 4-1 below. These correction factors shall be updated at each renewal of the crediting period, and project participants shall use the values from the latest version of the methodology at renewal of the crediting period.

Table 4-2 Baseline correction factor for metals, plastics and glass from virgin materials

Metal	Bi adjustment factor based on the share of the production in non-Annex I countries
Aluminium	0.72

Therefore, $BE_y = BE_{metal,y}$ = 14,500 t×0.72×8.4 tCO_2/t× (1-30%) =61,387 tCO_2e

5.2 Project Emissions

Project emissions include emissions associated with the energy use at recycling facility and at the processing facility and are calculated based on the equation below.

Since Hubei Chengzi Aluminium Industry Co., Ltd. recovers the waste aluminium not only from MSW, but also from e-waste. It is necessary to allocate the project emissions to each mass unit of separated material at market price. According to "Methodology AMS-III.AJ", for project activities where the recycling facility includes waste sorting and treatment, the project emissions are calculated according to the following formula:

$$EC_{i,PJ,y} = EC_{PJ,y} \times \frac{Q_{i,y} \times \$_{i,y}}{\sum_s (Q_{s,y} \times \$_{s,y})} \tag{4}$$

$$FC_{f,i,PJ,y} = FC_{f,PJ,y} \times \frac{Q_{i,y} \times \$_{i,y}}{\sum_s (Q_{s,y} \times \$_{s,y})} \tag{5}$$

$$PE_y = \sum_i Q_{i,y} \times \left[EC_{i,PJ,y} \times EF_{el,PJ,y} + \sum_f \left(FC_{f,i,PJ,y} \times NCV_{f,y} \times EF_{f,CO2,y} \right) \right] \tag{6}$$

Where :

PE_y	=	Project emissions in year y (t CO_2/y)
i	=	Material type – Aluminium
$Q_{i,y}$	=	Quantity of material type i recycled in year y (t).
$EC_{PJ,y}$	=	Electricity consumed by the recycling facility in year y (MWh)
$FC_{f,PJ,y}$	=	Fuel type f consumed by the recycling facility in year y (unit mass or volume)
$NCV_{f,y}$	=	Net calorific value of the fossil fuel type y consumed in the recycling facility in year y (GJ/unit mass or volume)
$EF_{f,co2,y}$	=	CO_2 emission factor of the fossil fuel type y consumed at the recycling facility in year y (tCO_2/GJ)
s	=	Type of material segregated at the recycling facility with a market price, including plastic and other marketable items such as organics
$EC_{i,PJ,y}$	=	Total electricity consumption of the recycling facility in year y apportioned to product i (MWh)
$FC_{f,i,PJ,y}$	=	Total fossil fuel type f consumption of the recycling facility in year y apportioned to product i (unit mass or volume)

$Q_{s,y}$	=	Quantity of material type s segregated in the recycling facility in year y (t)
$\$_{i,y}$	=	Sale price of the product i in year y
$\$_{s,y}$	=	Sale price of the segregated material type s in year y

Since it is not possible to count the electricity and fossil fuel consumption of product i/tonne, the electricity and fossil fuels required to produce the total weight of product i are used to calculate the project's emissions, so equation (6) becomes the following equation:

$$PE_y = \sum_i \frac{Q_{i,y} \times \$_{i,y}}{\sum_s (Q_{s,y} \times \$_{s,y})} \times \left[EC_{PJ,y} \times EF_{el,PJ,y} + \sum_f \left(FC_{f,PJ,y} \times NCV_{f,y} \times EF_{f,CO2,y} \right) \right]$$

(7)

1) Calculation of fossil fuel emission factor $EF_{f,CO2,y}$

The fuel is natural gas. Based on IPCC 2006 GHG inventories:

- $EF_{f,CO2,y} = EF_{natural\ gas,co2,y} = 54{,}300 kgCO_2/TJ = 0.0543\ tCO_2/GJ$

2) Calculation of grid electricity emission factor $EF_{el,pj,y}$

The emission factor for the baseline electricity consumption for virgin aluminium production in the host party (parameter $EF_{el,pj,y}$) shall be determined based on the weighted average consumption of electricity from the electric grid(s) and from captive power plant(s) as indicated in the equation below. Project participants may choose to fix this parameter ex-ante and update it at the renewal of the crediting period or monitor this parameter ex-post. If the parameter is fixed ex-ante, it shall be calculated using the most recent data available.

$$EF_{el,pj,y} = \frac{\sum_k \left(EF_{BL,grid,k,y} \times EC_{BL,grid,k,y} \right) + \sum_j \left(EF_{BL,captive,j,y} \times EC_{BL,captive,j,y} \right)}{\sum_k EC_{BL,grid,k,y} + \sum_j EC_{BL,captive,j,y}}$$

(7)

Where:

$EF_{BL,grid,k,y}$	=	Emission factor of the grid k supplying electricity to produce virgin aluminium in the host party in year y (tCO_2/MWh)
$EC_{BL,grid,k,y}$	=	Electricity consumed from the grid k to produce virgin aluminium in the host country in year y (MWh)
$EF_{BL,captive,j,y}$	=	Emission factor of the captive power plant j supplying electricity to produce virgin aluminium in the host party in year y (tCO_2/MWh)
$EC_{BL,captive,j,y}$	=	Electricity consumed from the captive power plant j to produce virgin aluminium in the host country in year y (MWh)

In China, the electricity used for producing the aluminium is normally supplied by the national grid, therefore, the equation (7) will be simplified as:

$$EF_{el,pj,y} = EF_{BL,grid,k,y} \tag{8}$$

In order to more accurately and conveniently develop CDM projects in China's key emission reduction areas and China's voluntary greenhouse gas emission reduction projects (CCER projects) in compliance with the CDM rules, the Department of Climate Change of the Ministry of Ecology and Environment (MOE) studied and determined the baseline emission factors of China's regional power grids for the FY2019 emission reduction projects, and consulted with the relevant departments and the Designated Operational Entities (DOE). The above organizations unanimously agreed that the data of the baseline emission factor for China's regional power grid for the 2019 emission reduction project is true, the calculation is reasonable and the result is credible[18].

It also contains an annex for the calculation of OM, BM according to TOOL07: "Tool to calculate the emission factor for an electricity system (Version 07.0)".

$EF_{grid,OM}$ =0.7921, $EF_{grid,BM}$ =0.387, W_{OM}=50%, W_{BM}=50%

$EF_{grid,CM,y}$=0.7921×50%＋0.3870×50%=0.5896 tCO_2/MWh

Therefore, $EF_{el,pj,y}$= $EF_{grid,CM,y}$ =0.5896 tCO_2/MWh

3) $Q_{i,y}×\$_{i,y}$ / $Q_{s,y}×\$_{s,y}$

Since there is almost no difference in the selling price of recycled aluminium products, it is feasible to estimate the sales share based on the production line's capacity of 0.0725% of the total design capacity.

4) $NCV_{f,y}$

According to the "Guidelines for Corporate Accounting and Reporting of Greenhouse Gas Emissions from Electricity Generating Facilities"[19] the $NCV_{f,y}$ is 389.31 $GJ/10^4 Nm^3$.

According to the methodology, for project activities that fall under Case A, the parameters ($EC_{PJ,y}$, $FC_{f,PJ,y}$) may be estimated based on the nameplate specific energy consumption of the equipment used and the average time of operation and level of service delivered, or based on measurement campaigns of the energy consumption under typical operation conditions.

The Project belongs to Case A, and the electricity consumption and the fuel fossil consumption for the Project activity ($EC_{PJ,y}$, $FC_{f,PJ,y}$) is determined by direct measurement.

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[18] https://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/t20201229_815386.shtml

[19] https://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202212/t20221221_1008430.html

Therefore, PE_y = 0.0725%$\times$(14,000MWh$\times$0.5721 tCO_2/MWh$+$1400$\times 10^4$ Nm^3 $\times$ 389.31GJ/10^4 $Nm^3$$\times$0.0543$tCO_2$/GJ)=2,726 tCO_2e

5.3 Leakage Emissions

According to the methodology: "if it is demonstrated that organic biogenic waste segregated in the recycling facility would otherwise have been deposited in a landfill without methane recovery in the baseline scenario, or if the baseline scenario is the incineration of the wastes, then no leakage calculation is required."

For the project, the processed material is the waste aluminium after cleaning and classification, therefore, no organic biogenic waste is involved, the waste recycled is only aluminium, and they would be incinerated in the incineration, therefore, in the project situation, no leakage calculation is required.

5.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

Emission reduction due to the project activity during the year y are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \qquad\qquad (9)$$

Baseline emission (BE_y)

Baseline emissions in accordance with the last paragraph of section 5.1:

$BE_y = BE_{metal,y}$ = 14,500 t$\times$0.72$\times$8.4 tCO_2/t$\times$(1-30%) =61,387 tCO_2e

Project emission (PE_y)

Project emissions in accordance with the last paragraph of section 5.2:

PE_y = 0.0725%$\times$(14,000MWh$\times$0.5721 tCO_2/MWh$+$1400$\times 10^4$ Nm^3 $\times$389.31GJ/10^4 Nm^3 $\times$0.0543tCO_2/GJ)=2,726 tCO_2e

Leakage emission (LE_y)

According to the methodology, there will be no leakage caused by the project activity. Thus LE_y=0 tCO_2e.

Emission reduction (ER_y)

The emission reduction (ER_y) by the project activity is:

$ER_y = BE_y - PE_y - LE_y$=61,387 $tCO_2e$$-$2,726 $tCO_2e$$-$0 tCO_2e =58,661 tCO_2e

Vintage period	Estimated baseline	Estimated project	Estimated leakage	Estimated reduction	Estimated removal	Estimated total VCUs (tCO₂e)

	emissions (tCO$_2$e)	emissions (tCO$_2$e)	emissions (tCO$_2$e)	VCUs (tCO$_2$e)	VCUs (tCO$_2$e)	
01-Mar-2022 to 31-Dec-2022	51,156	2,272	0	48,884	0	48,884
01-Jan-2023 to 31-Dec-2023	61,387	2,726	0	58,661	0	58,661
01-Jan-2024 to 31-Dec-2024	61,387	2,726	0	58,661	0	58,661
01-Jan-2025 to 31-Dec-2025	61,387	2,726	0	58,661	0	58,661
01-Jan-2026 to 31-Dec-2026	61,387	2,726	0	58,661	0	58,661
01-Jan-2027 to 31-Dec-2027	61,387	2,726	0	58,661	0	58,661
01-Jan-2028 to 31-Dec-2028	61,387	2,726	0	58,661	0	58,661
01-Jan-2029 to 28-Feb-2029	10,231	454	0	9,777	0	9,777
Total	429,709	19,082	0	410,627	0	410,627

6   MONITORING

6.1   Data and Parameters Available at Validation

Data / Parameter	B_i
Data unit	-
Description	Baseline correction factor for metals, plastics and glass from virgin materials

Source of data	CDM Methodology AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 9.0, Sectoral scope:13
Value applied	0.72
Justification of choice of data or description of measurement methods and procedures applied	From the methodology AMS-III.AJ, 5.2.1, baseline emission for aluminium recycling, default value.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	SEC_i
Data unit	tCO_2/t_i
Description	Specific CO2 emission factor for production of metal i
Source of data	CDM Methodology AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 9.0, Sectoral scope:13
Value applied	8.40
Justification of choice of data or description of measurement methods and procedures applied	From the methodology AMS-III.AJ, 5.2.1, baseline emission for aluminium recycling, default value.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	DF
Data unit	-
Description	Discount factor for upstream displacement (use 30%)

Source of data	CDM Methodology AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 9.0, Sectoral scope:13
Value applied	0.30
Justification of choice of data or description of measurement methods and procedures applied	From the methodology AMS-III.AJ., 5.2.1, baseline emission for aluminium recycling, default value.
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$EF_{nature\ gas,co2,y}$
Data unit	tCO_2/GJ
Description	CO_2 emission factor of the baseline fossil fuel.
Source of data	CDM Methodology AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 9.0, Sectoral scope:13
Value applied	0.0543 (for nature gas)
Justification of choice of data or description of measurement methods and procedures applied	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, Table 1.4
Purpose of Data	Calculation of project emissions
Comments	As per the methodology: project participants shall assume that the baseline fuel is natural gas when it's not possible to identify the type of fuel consumed for the production of aluminium from virgin materials.

Data / Parameter	$EF_{OM,y}$
Data unit	tCO_2e/MWh
Description	Operating margin emission factor of the grid connected (CCG).

Source of data	"2019 Baseline Emission Factors for Regional Power Grids in China" issued by China's DNA on December 12, 2020
Value applied	0.8587
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of National Bureau of Statistics of China and National Development and Reform Commission
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	$EF_{BM,y}$
Data unit	tCO_2e/MWh
Description	Operating margin emission factor of the grid connected (CCG).
Source of data	"2019 Baseline Emission Factors for Regional Power Grids in China" issued by China's DNA on December 12, 2020
Value applied	0.2854
Justification of choice of data or description of measurement methods and procedures applied	China Official Data of National Bureau of Statistics of China and National Development and Reform Commission
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	$EF_{grid,CM,y}$ ($EF_{BL,grid,k,y}/EF_{el,PJ,y}$)
Data unit	tCO_2e/MWh
Description	Emission factor of the electric grid supplying electricity to the recycling facility in year y.

Source of data	The calculation is conducted based on data calculated by the Office of National Coordination Committee on Climate Change.
Value applied	0.5721
Justification of choice of data or description of measurement methods and procedures applied	CCG is selected as the Project electricity supplier. China Official Data of National Bureau of Statistics of China and National Development and Reform Commission can provide credible data.
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	W_{OM}
Data unit	-
Description	Weighting of operating margin emission factor
Source of data	TOOL07: Tool to calculate the emission factor for an electricity system (Version 07.0)
Value applied	50%
Justification of choice of data or description of measurement methods and procedures applied	Default vale
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	W_{BM}
Data unit	--
Description	Weighting of operating margin emission factor
Source of data	TOOL07: Tool to calculate the emission factor for an electricity

	system (Version 07.0)
Value applied	50%
Justification of choice of data or description of measurement methods and procedures applied	Default vale
Purpose of Data	Calculation of project emissions
Comments	N/A

Data / Parameter	$NCV_{f,y}$
Data unit	GJ/t
Description	Net calorific value of the fossil fuel type f consumed in the recycling facility in year y
Source of data	"2019 Baseline Emission Factors for Regional Power Grids in China" issued by China's DNA on December 12, 2020
Value applied	389.31 (Natural Gas)
Justification of choice of data or description of measurement methods and procedures applied	Official statistic, publicly accessible and reliable data source
Purpose of Data	Calculation of project emissions
Comments	N/A

6.2   Data and Parameters Monitored

Data / Parameter	$Q_{i,y}$
Data unit	t/y
Description	Quantity of waste aluminum collected at the recycling facility in year y
Source of data	Incoming Material Records

Description of measurement methods and procedures to be applied	Direct weighing and recording of the weight, cross checked with company's records that is invoiced and backed by receipt of payments.
Frequency of monitoring/recording	Recorded at the time of sending each consignment from recycling facility to processing/ manufacturing facility
Value applied	14,500
Monitoring equipment	Weighbridges and electronic scales
QA/QC procedures to be applied	The weighbridges and electronic scales are periodically checked and maintained; the receipt is for crosscheck.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$$\frac{Q_{i,y} \times \$_{i,y}}{\Sigma_s(Q_{s,y} \times \$_{s,y})}$$
Data unit	-
Description	Total consumption of fossil fuels and electricity at recycling and processing facilities in year f, apportioned according to the proportion of sales revenues from product i to total sales revenues from total product type s
Source of data	Sales ledger
Description of measurement methods and procedures to be applied	Direct weighing and recording of the weight, cross checked with company's records that is invoiced and backed by receipt of payments.
Frequency of monitoring/recording	Recorded at the time of sending each consignment from recycling facility to processing/ manufacturing facility
Value applied	0.0725
Monitoring equipment	Weighbridges and electronic scales

QA/QC procedures to be applied	The weighbridges and electronic scales is periodically checked and maintained; the receipt is for crosscheck.
Purpose of data	Calculation of project emissions
Calculation method	Since there is almost no difference in the selling price of recycled aluminum products, it is feasible to estimate the sales share based on the production line's capacity of 13% of the total design capacity.
Comments	-

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh
Description	Electricity consumption of the recycling facility in year y
Source of data	Measured by meters installed at the project site, as well as electricity usage logs
Description of measurement methods and procedures to be applied	Continuous measurement and at least monthly recording
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value applied	14,000
Monitoring equipment	Electricity Meters
QA/QC procedures to be applied	The recycling plant checks completeness of invoices concerning electricity consumption. The project proponent and local grid company will check the meter together monthly, then the grid company issues the invoice, and the project proponent will pay the bill. The electricity meter will be calibrated annually.
Purpose of data	Calculation of project emissions
Calculation method	-

Comments	-

Data / Parameter	$FC_{f,PJ,y}$
Data unit	t or $10^4\,Nm^3$
Description	Quantity of natural gas combusted during the year y
Source of data	Natural Gas Statement
Description of measurement methods and procedures to be applied	Based on purchase records and meter measurements at the pipeline
Frequency of monitoring/recording	Specify measurement and recording frequency
Value applied	1,400.00
Monitoring equipment	-
QA/QC procedures to be applied	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based onpurchased quantities and stock changes.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

6.3   Monitoring Plan

This section describes the process and schedule for obtaining, recording, and analysing the monitored data set out in Section 6.2 above.

① **Data and parameters monitored**

As stated in Section 6.2, quantity of waste aluminum recycled in year y ($Q_{i,y}$), electricity consumed by the recycling facility in year y ($EC_{PJ,y}$), natural gas consumed by the recycling facility in year y ($FC_{gas,PJ,y}$ and $FC_{diesel,PJ,y}$), percentage of sales revenue from recycled aluminium resulting from the processing of aluminium scrap from MSW in year y ($\frac{Q_{i,y}\times\$_{i,y}}{\sum_s(Q_{s,y}\times\$_{s,y})}$)are the parameters to be monitored. These four parameters (quantity of waste

aluminum, sales revenue as a percentage, electricity consumption, natural gas consumption) are monitored by a truck scale, an electricity meter ,a flow meter, respectively.

A team of monitoring officers are responsible for monitoring and recording, which include recording the truck scale readings at the time of receiving each consignment of waste aluminum entering the project site and sale, recording the electricity meter readings every month and recording the flow meter readings regularly.

② **Management of the monitoring plan**

The project proponent has established a VCS monitoring team in charge of measuring and recording of the parameter values, collecting relevant documents (such as sales/purchase receipts) as well as calculating emission reductions.

The VCS manager takes full responsibility for the overall implementation of the monitoring plan. The monitoring activities, including recording and document collecting, are carried out by a team of monitoring officers.

In addition, the internal verifiers are in charge of internal check of the data and files as well as calculation of emission reductions. A monitoring manual regarding the project, which stipulates detailed duties and responsibilities of all members of the monitoring team, has been developed and serves as the basis of the monitoring plan.

All the relevant data files will be kept by the project proponent during the crediting period and at least for two years after the end of the last crediting period.

③ **Quality assurance and quality control**

The monitoring data will be cross checked with corresponding sales/purchase receipts to ensure the data quality. Calibration of the monitoring instruments should be conducted in compliance with relevant national or industry standards and rules, and all the calibration records should be documented and archived by the project proponent for verification.

④ **Procedures of exception handling and reporting**

The monitoring staff will continuously monitor the operation status of the measuring instruments to ensure that any abnormity could be detected as soon as possible and that the corresponding trouble-shooting measures will be taken in time. The measuring instrument will be repaired immediately and must be calibrated by a qualified third-party before being put into use again.

Problem that occurred in monitoring and measurement process will be recorded and reported to company administrator or supervisor; measures will be adopted to avoid the same problem reoccurring in the future.

⑤ **Emergency procedure**

In case of any failure or malfunction of any monitoring instrument, the project participant and the equipment suppliers will repair or displace it as soon as possible, and the emission reductions achieved during the troubleshooting period will be calculated conservatively.

During the reported monitoring period, no emergency occurred, and on event, which might impact the monitoring plan, the applied methodology or the calculation of emission reductions, occurred.

7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

7.1 Data and Parameters Monitored

Data / Parameter	$Q_{i,y}$
Data unit	t
Description	Quantity of waste aluminum collected at the recycling facility in year y
Value applied:	Quantity of waste aluminum recycled during the monitoring period is shown below.

Monitoring period	Value
1-Mar-2022 to 31-Dec-2022	20,617
1-Jan-2023 to 31-Jul-2023	2,957
Total	23,574

Comments	The incoming statistics of waste aluminum are based on the time of arrival, while the sales volume statistics are based on the time of signing the sales contract, so there will be a slight deviation.

Data / Parameter	$EC_{PJ,y}$
Data unit	MWh

Description	Electricity consumption of the recycling facility in year y	
Value applied:	Monitoring period	Value
	1-Mar-2022 to 31-Dec-2022	3,209
	1-Jan-2023 to 31-Jul-2023	2,877
	Total	6,086
Comments	The electricity consumption is continuously monitored and monthly recorded. For this monitoring period, the recorded values from the electricity meter have been cross checked with electricity purchase receipts.	

Data / Parameter	$FC_{nature\ gas,PJ,y}$	
Data unit	$10^4\ Nm^3$	
Description	Quantity of natural gas combusted during the year y	
Value applied:	Monitoring period	Value
	1-Mar-2022 to 31-Dec-2022	270
	1-Jan-2023 to 31-Jul-2023	167
	Total	437
Comments	The natural gas consumption is continuously monitored and regularly recorded. For this monitoring period, the recorded values from the flow meter have been cross checked with natural gas purchase receipts.	

Data / Parameter	$FC_{diesel\ oil,PJ,y}$
Data unit	t

Description	Quantity of diesel oil combusted during the year y
Value applied:	<table><tr><td>Monitoring period</td><td>Value</td></tr><tr><td>1-Mar-2022 to 31-Dec-2022</td><td>92</td></tr><tr><td>1-Jan-2023 to 31-Jul-2023</td><td>46</td></tr><tr><td>Total</td><td>138</td></tr></table>
Comments	The diesel oil consumption is continuously monitored and regularly recorded. For this monitoring period, the recorded values from the records of use have been cross checked with diesel oil purchase receipts.

Data / Parameter	$\dfrac{Q_{i,y} \times \$_{i,y}}{\sum_s(Q_{s,y} \times \$_{s,y})}$
Data unit	%
Description	Sales of waste aluminum collected at recycling facilities as a proportion of sales of all types of recycling in year y
Value applied:	<table><tr><td>Monitoring period</td><td>Value</td></tr><tr><td>1-Mar-2022 to 31-Dec-2022</td><td>60.60%</td></tr><tr><td>1-Jan-2023 to 31-Jul-2023</td><td>14.3%</td></tr></table>
Comments	Recycling aluminum sales are continuously monitored and recorded. During this monitoring period, the values recorded for sales volumes have been cross-checked with sales contracts.

Data / Parameter	Performance Testing
Data unit	-

Description	There are no set quality standards for recycled aluminum because each downstream end-product processing facility has different performance needs. However, all recycled aluminum must be laboratory tested and accepted by downstream facilities before they can be used and sold, and quality standards for the performance of recycled aluminum are included in the sales contract. Specific test sheets are submitted at the time of validation.
Value applied:	-
Comments	-

7.2 Baseline Emissions

$$BE_{metal,y} = \sum_i Q_i \times B_i \times SE_i \times (1 - DF)$$

Where data and parameters available at validation are:

$B_i = 0.72$

$SE_i = 8.40$

$DF = 30\%$

The calculation results are shown in the table below.

Monitoring period	$Q_{i,y}$ (t)	BE (tCO$_2$e)
1-Mar-2022 to 31-Dec-2022	20,617	87,282
1-Jan-2023 to 31-Jul-2023	2,957	12,518
Total (1- Mar -2022 to 31- Jul - 2023)	23,574	99,800

7.3 Project Emissions

$$PE_y = \sum_i \frac{Q_{i,y} \times \$_{i,y}}{\sum_s (Q_{s,y} \times \$_{s,y})} \times \left[EC_{PJ,y} \times EF_{el.PJ,y} + \sum_f \left(FC_{f,PJ,y} \times NCV_{f,y} \times EF_{f,CO2,y} \right) \right]$$

Where data and parameters available at validation are:

$EF_{el,PJ,y} = 0.5721$ tCO$_2$/MWh

$NCV_{nature\ gas,y} = 389.31$ GJ/10^4 Nm^3 (natural gas)

$EF_{\text{nature gas,PJ,y}}$ = 0.0543 tCO$_2$/GJ (natural gas)

$NCV_{\text{diesel oil,y}}$ = 42.652 GJ/t (diesel oil)

$EF_{\text{diesel oil,co2,y}}$ = 0.0726 tCO$_2$/GJ (diesel oil)

The calculation results are shown in the table below.

Monitoring period	$Q_{i,y}$ (t)	$EC_{PJ,y}$ (MWh)	$FC_{\text{nature gas,PJ,y}}$ (10^4 Nm^3)	$FC_{\text{diesel oil,PJ,y}}$ (t)	$\dfrac{Q_{i,y} \times \$_{i,y}}{\Sigma_s(Q_{s,y} \times \$_{s,y})}$	PE (tCO$_2$e)
1-Mar-2022 to 31-Dec-2022	20,617	3,209	270	92	60.60%	4,743
1-Jan-2023 to 31-Jul-2023	2,957	2,877	167	46	14.35%	764
Total (1- Mar - 2022 to 31- Jul -2023)	23,574	6,086	437	138	-	5,507

7.4 Leakage Emissions

As per the Section 5.3: leakage calculation, there is no leakage to be considered for the project. Therefore, LE_y=0.

7.5 GHG Emission Reductions and Carbon Dioxide Removals

Net GHG emission reductions and removals achieved for this monitoring period, calculated by using Equation (12) in Section 5.4, are shown in the following table.

Vintage period	Baseline emissions (tCO$_2$e)	Project emissions (tCO$_2$e)	Leakage emissions (tCO$_2$e)	Reduction VCUs (tCO$_2$e)	Removal VCUs (tCO$_2$e)	Total VCUs (tCO$_2$e)
1-Mar-2022 to 31-Dec-2022	87,282	4,743	0	82,539	0	48,884[20]

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[20] The achieved emission reductions/removals for this monitoring period is more than Ex ante emission reductions/removals (82,839 tCO$_2$e.>48,884 tCO$_2$e.), based on the principle of conservative, the total VCUs is adjusted to 48,884 tCO$_2$e.

1-Jan-2023 to 31-Jul-2023	12,518	764	0	11,754	0	11,754
Total (1- Mar - 2022 to 31- Jul -2023)	99,800	5,507	0	94,293	0	60,638

Ex ante emission reductions/removals and achieved emission reductions/removals for this monitoring period, along with the percentage difference and the justification for that different are shown in Table 7.1.

Table 7.1 Ex ante and achieved ER comparison

Vintage period	Ex-ante estimated reductions/ removals	Achieved reductions/ removals	Percent difference	Explanation for the difference
1-3-2022 to 31-12-2022	48,884	82,539	68.85%	Due to the fact that the new factory is still in production, production is unstable; The production line is not activated all year round, but is concentrated after saving a certain number of orders. The sum of 68.85% and -65.65% is 3.2%, close to 0, so this is largely related to centralized production.
1-1-2023 to 31-7-2023	34,219	11,754	-65.65%	
Total (1-3-2022 to 31-7-2023)	83,103	94,293	-	