



Project Design Document

Greentech' Emission Reductions from PET Recycling, Romania

Documentation written by:
Casiana Fometescu
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**Project design document form
(Version 10.1)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title of the project activity	Greentech' Emission Reductions from PET Recycling, Romania
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the PDD	4.0
Completion date of the PDD	15/02/2019
Project participants	Greentech S.A.
Host Party	Romania
Applied methodologies and standardized baselines	Methodology: AMS-III.AJ. Recovery and recycling of materials from solid wastes - Version 6.0
Sectoral scopes linked to the applied methodologies	Sectoral Scope 13. Waste Handling and Disposal
Estimated amount of annual average GHG emission reductions	45,380 tCO ₂ e per year

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

“Greentech’ Emissions Reductions from PET Recycling, Romania” project (hereinafter called “the Project”) start date is 19th October 2012.

R-PET plant:

The Project’s first tender for the acquisition of the PET1 R-PET (Recycled-PET) line was 19th October 2012, which is the start date of the project. Then, it had the final commissioning of the R-PET line from PET post consumed bottles on 1st October 2014, and began commercial operation on 27th October 2014, in line with its Environment Authorisation no. 233/27.10.2014¹.

The Project has been recycling PET waste, reducing energy consumption that would otherwise be required for the production of plastic products made of virgin inputs, and consequently reducing greenhouse gases emissions (GHGs).

The Project activity has been implementing in Buzau county, in the city of Buzau, which is located in the South Eastern part of Romania in Muntenia province. The coordinates for the recycling plants in Buzau obtained using GPS are: 45°08’01.17724”N, 26°49’12.39768”E. The output capacity of the R-PET plant in Buzau is 12,000 tons/year.

Strap plant:

In 2015, Greentech started the investment for the strap production, and it started the construction of a new automatic line, which was finalized on December 2016. The new line is located in Frasinu Industrial Park, Tintesti village (3 kilometers far from Buzau city), having the following GPS coordinates: 45°06’26.04644”N, 26°49’41.13368”E. The output capacity of the strap plant in Frasinu is 9000 tons/year. From August 2016, Greentech switched from light fuel oil (LFO) to natural gas at Frasinu plant.

Fibre plant:

In 2016, another investment was started for the production of the fiber in Urziceni, a location closed to Buzau (53 kilometers from Buzau city). The fiber line from Urziceni have the following GPS coordinates: 44°43’05.2”N; 26°38’43.1”E. The output capacity of the polyester fiber plant is 32,400 tons/year.

Greentech S.A. company was set up in 2003, consisting of two washing lines for PET bottles. Until 2014, important development stages were performed at Greentech S.A., including five washing lines and a new automatic sorting plant. These first activities cannot be considered recycling activities as understood by the methodology “AMS-III.AJ. Recovery and recycling of materials from solid wastes” - version 06.0. The main development stages of the Project for R-PET, strap, and fiber production are presented in the Appendix 8.

The Projects recycling activities as understood by the methodology AMS-III.AJ. started later on 19th October 2012, when it was the Project’s first tender for the acquisition of the PET1 R-PET line.

Greentech buys from collectors, which are authorized companies for plastic waste collection activities, and from companies which generate such a waste: PET post-consumer bottles with or without caps, with or without labels, sorted or not by colours, baled PET in view of transportation to project locations.

¹ In the Environment Authorisation no. 233/27.10.2014, Greentech S.A. is authorised to develop the following activity: “PET waste flakes processing in granulates forms, according to CAEN 3832 – Recovery of waste sorted recycled materials”.

The project is developed by Greentech S.A., which is part of Green Group and comprises five recycling companies in Romania: Greentech S.A. (R-Pet and PET strap production), GreenFiber International S.A. (PET fiber production), GreenWEEE International S.A., GreenLamp Reciclare S.A., and GreenGlass Recycling S.A. The fiber plant runs under GreenFiber International S.A., the sister company of Greentech S.A.

According to Appendix B to the “Simplified modalities and procedures for small-scale CDM project activities”, the proposed small scale project activity corresponds to Type III: Other project activities.

Furthermore, the Project is in line with specific UN requirements because it:

- Contributes to local environmental sustainability;
- Recycling instead of using material from virgin inputs decreases the overall energy use, GHGs and environmental burden from natural resources extraction. At the same time, recycling of PET waste will reduce the amount of waste to be disposed in the landfill.
- Contributes towards better working conditions in the local region;
- Increases employment opportunities in the area where the project is located;
- Contributes towards better revenue distribution to improve local and regional economic development;
- Contributes to development of local technological capacity because the manpower and the technical maintenance are provided domestically in the country;
- Contributes to regional integration and connection with other sectors;
- Contributes to the local municipalities' funds for social insurance, such as health and pension funds;
- Contributes to local and social community development.

The left image is an aerial view of the PET recycling plant. Labels indicate various stages and areas: 'PET wash', 'PET chip processing', 'PET chips', 'PET flakes for re-melting', 'hall for sorting and washing', 'GreenWaste', 'recycling line', 'other wastes (PP, PE)', 'pump station', 'central heating', and 'recycling line for PET waste'. The right image shows a worker in a green uniform and hard hat operating a large industrial machine labeled 'Reinforced PET' to process a large roll of green PET material.

A.2. Location of project activity

The Project is located in the Eastern part of Romania, in Buzau region, within Buzau city and Tintesti village.

The host party is Romania. Romania ratified Kyoto Protocol on 2002 together with all EU countries. Romania signed Paris Agreement on 22nd April 2016 together with all EU countries and sent the instrument for ratification the Paris agreement on 1st June 2017.

The plants within the Project are located at 110 km NE from Bucharest, the capital of Romania in Buzau city (R-PET plant), Tintesti village (strap recycling plant), and at 60 km NE from Bucharest in Urziceni city (fiber recycling plant).

The coordinates for the R-Pet recycling plants in Buzau obtained using GPS are: 45°08'01.17724"N, 26°49'12.39768"E.

The coordinates for the strap recycling plant in Frasinu Industrial Park, Tintesti village, Buzau county, obtained using GPS are: 45°06'26.04644"N, 26°49'41.13368"E.

The coordinates for the fiber recycling plant located in Urziceni, Ialomita county, using GPS are: 44°43'05.2"N; 26°38'43.1"E.



Greentech PET Recycling Plant in Buzau

A.3. Technologies/measures

A3.1. Greentech recycling plant

The trucks loaded with raw bottles packaged in bales come to the reception station where the merchandise is weighed, the bales are unloaded, and quality is assessed by control quality department. On each bale is applied a label corresponding to the quality (A, B, C, or D) and containing a bar code that contains all the data about the delivery, colour and average weight of bale.

The processing of the bottles comprises three main stages:

- sorting by colour and removal of mechanical contamination
- crushing of the bottles into flakes (small pieces of 2-12 mm)
- hot washing of the flakes leading to final clean flakes with purity more than 99.5% PET

Greentech disposes of an automatic sorting plant of 7 ton/h input (5.6 ton/h output) of raw bottles that performs the separation of the mixed coloured raw bottles by individual colours and removal of the mechanical contamination and foreign polymers.

The automatic sorting process consists of the next stages:

- feeding on belt conveyor and weighing
- de-baling
- screening into a trommel to remove the coarse garbage
- first manual sorting to remove big contaminants(foils, cardboard, stones, textiles, different other bodies etc.)
- removal of flat contamination (small foils, labels, papers) in a ballistic separator
- removal of ferrous bodies by a magnetic separator
- removal of aluminium and other nonferrous bodies
- final removal of 2D bodies (foil, labels)
- removal of other plastics (PVC, PC, PA, PS, ABS etc.), including PET bottles with PVC labels at 1-st NIR station
- separation by colours (clear, blue, green, brown, other colour bottles) in a cascade of 7 NIR station
- removal of the PVC labels
- final manual sorting of the separated bottles by colours

The automatic sorting plant is directly connected to washing hall as the conveyors with bottles go straight to bunkers without any intermediary stage. The sorted bottles are stored by colours in 6 bunkers of 80m³ each and are automatically sent to 4 Herbold crushers of 4 tons/h input (crusher no. 1) and respectively 3 ton/h input for each of the others three. The flakes produced by crushers are cold washed by friction, dried and stored by colours in 5 individuals silos of 45 m³ each, for crusher no. 2, 3, and 4.

■ Besides the automatic sorting plant, there is another capacity consisting of three lines of manual sorting, crushing, cold washing and drying, with a total capacity of 3.3 tons/h input (2.6 ton/h output).

The flakes produced here are sent to the same 5 silos of 45 m³ to feed the washing lines.

These cold washed flakes are further processed in 6 hot washing lines as follows:

Line 1(from B+B) with capacity 2.6 ton/h output, directly connected at crusher no 1

Line 2-6 with capacity of 1 ton/h output each

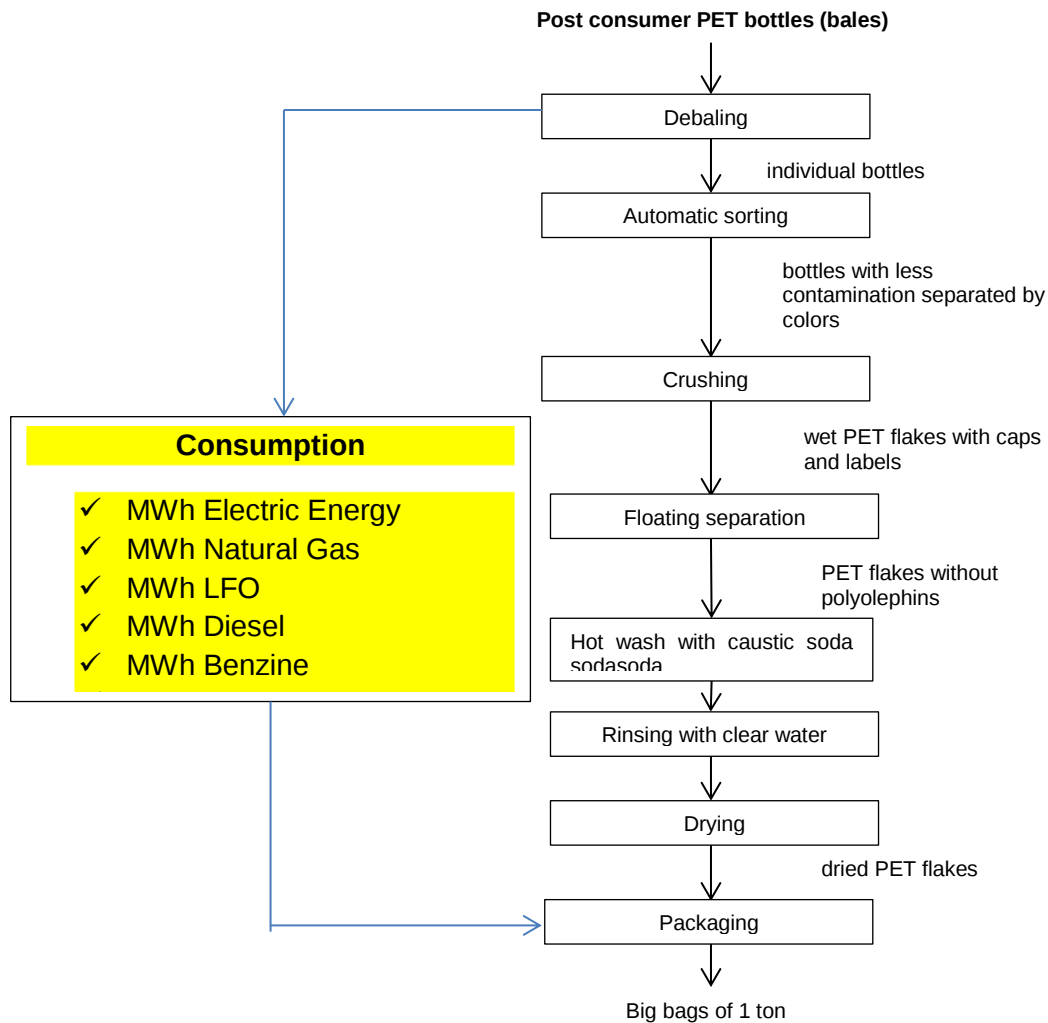
■ Besides of these washing lines, there is the line no. 7 from Sorema with output capacity 0.7 ton/h that have its own manual sorting plant, input capacity 1 ton/h.

The washing process of the flakes comprises the next operations:

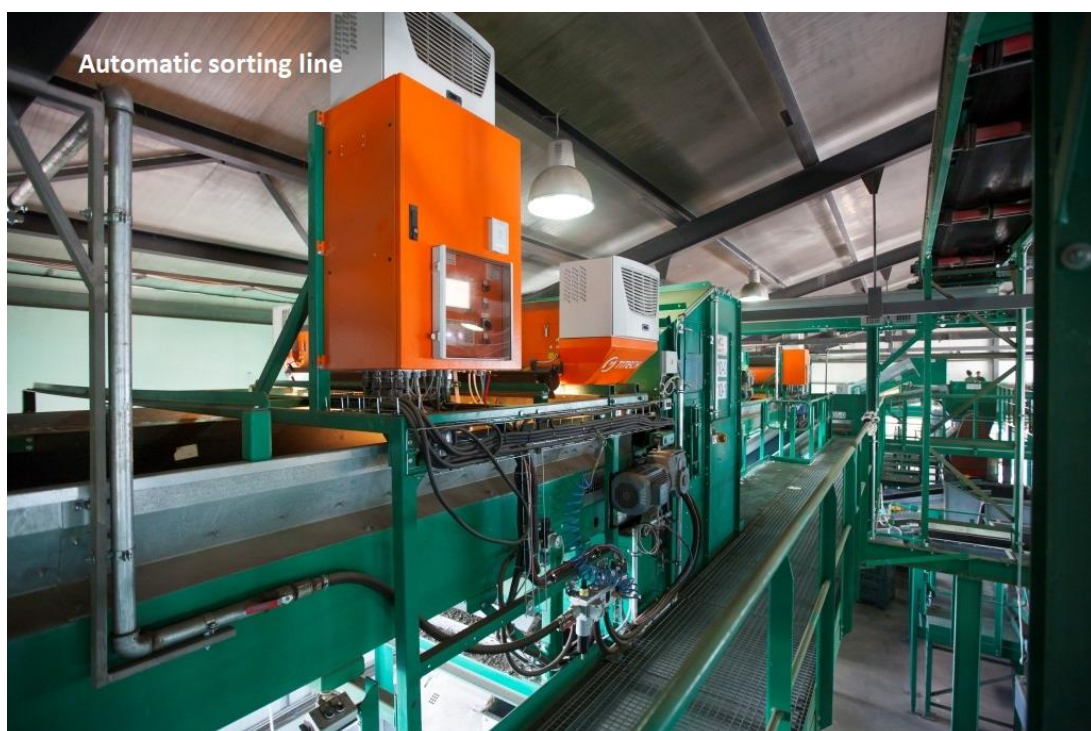
- removal of the labels, foils and caps in the floating tank, by difference in specific gravity
- hot washing at 70-90° C with caustic soda and specific detergents
- separation of the glue and last solid contaminants
- final cleaning with clean water
- mechanical and thermal drying
- fines separation
- packaging in big bags of 1 ton.

The total capacity of Greentech in 2015 was 6000 tons/month clean, hot washed PET flakes.

Table1. PET Recycling Process for Flakes



Pictures from Greentech automatic sorting and washing plants may be seen below:





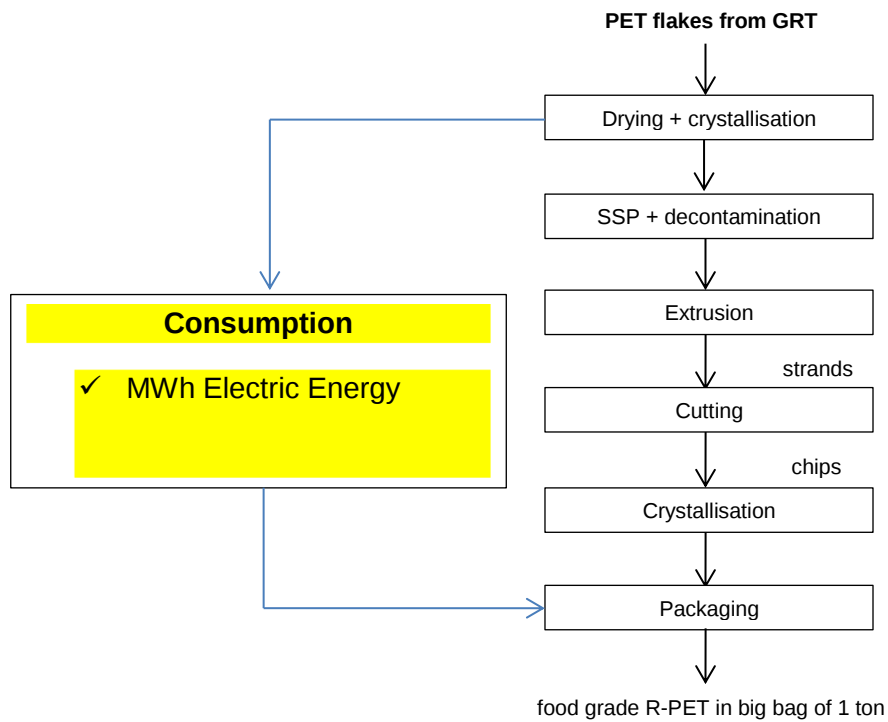
A.3.2. Greentech PET recycled pellets food grade for “bottle to bottle”

This plant consists of three production lines type Vacurema (2) and Erema prime (1) with a total capacity 1000 tons/month 100% recycled food grade pellets.

The process consists in the following stages: drying, solid state poly-condensation, extrusion, pelletizing, crystallisation, packaging. A picture could be seen below:



Table 2. PET Recycling Process from Flakes to PET Recycled Pellets –“R-PET” Food Grade for “Bottle to Bottle”



A.3.3 Greentech PET recycled strap lines

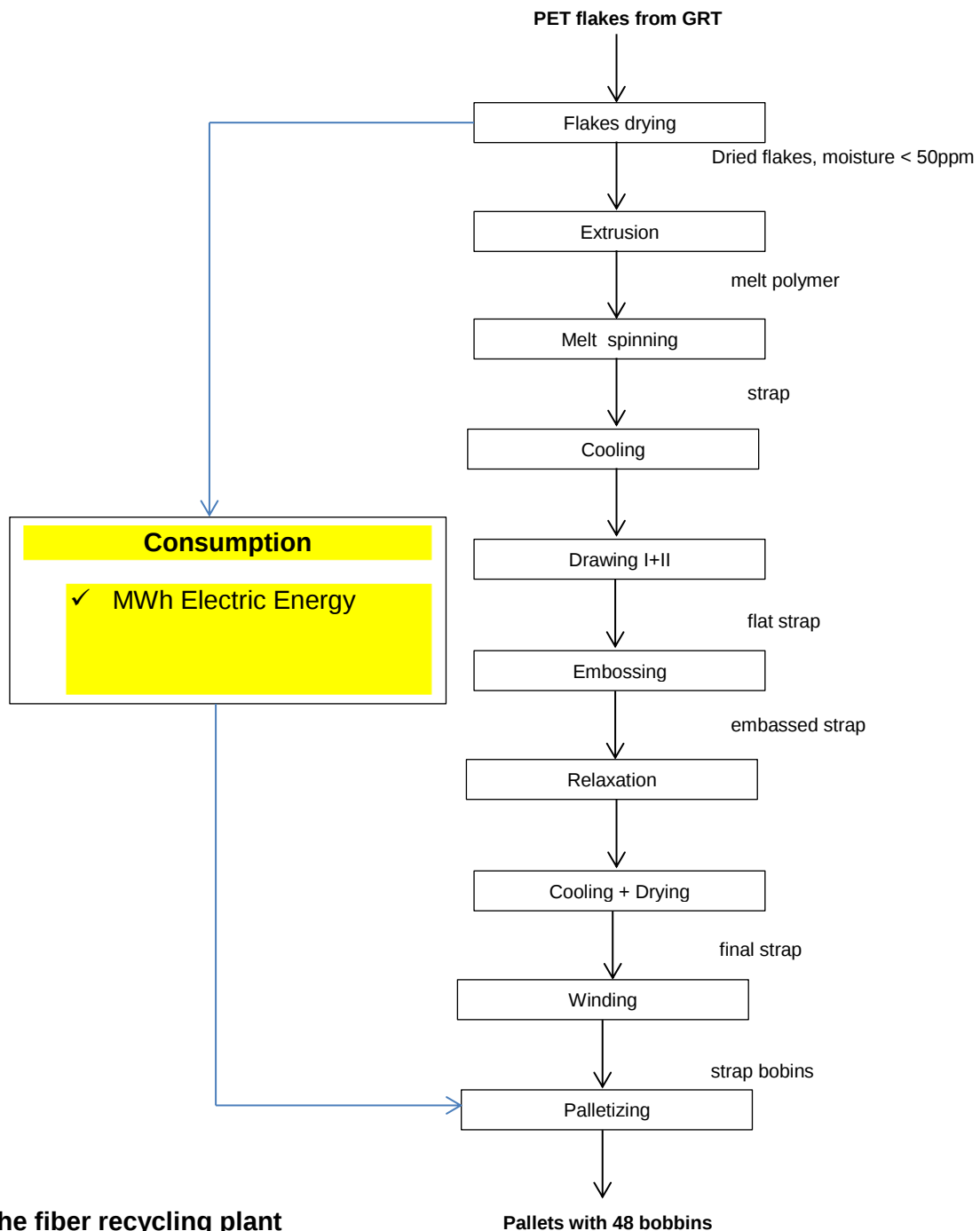
Greentech PET recycled strap lines consist in two production lines of 350 tons/month each of them using the one step (compact) technology.

The process consists in the following stages: drying, extrusion, cooling, drawing, relaxation, final cooling, winding, and palletising.

A picture of the PET recycled strap line may be seen bellow:



Table 3. PET Recycling Process from Flakes to PET Recycled Strap



A.3.4. The fiber recycling plant

There are two main stages for the conversion of PET bottle wastes into polyester recycled fibers:

1. The processing of PET bottles wastes into PET recycled flakes

This process takes place in Greentech S.A., and it is described above at A3.1.

2. The processing of the PET recycled flakes into polyester recycled fiber

This process takes place in Greenfiber International S.A. at Urziceni production site.

The production process of polyester fiber using recycled PET flakes comprises two parts:

3.4.1. Part I Drying – Extrusion - Spinning

- Receiver for flakes-buffer silo for flakes

- crystallizer-continuous dryer
- screw extruder
- polymer filter-spinning box
- spinning pumps-spinning pack-quench device
- spinning corridor
- take-up rollers
- sun flower gear
- tow can device.

In spinning stage are produced the filaments at the required fineness(dtex) for the final dtex in the subsequent stage.

The Urziceni plant consists of six sets of drying-extrusion equipments of 800 kg/h each that finally are grouped on two spinning walls, and two ends of lay down of the cables of filaments into cans.

3.4.1.1. Continuous drying

The flakes are sucked from level 0.0 m and sent at level +32.0 m through pipes under vacuum produced by roots blowers.

They reach to a receiver foreseen bellow with a rotary device that send the flakes into a buffer silo. From this silo, the flakes fall down by gravity into crystallizer, foreseen with mixer where takes place the crystallization process and removal of the moisture down to 0.6%.

This process is performed by hot air at 160 C deg and the residence time is 3 hours.

In continuation, the flakes fall down by gravity into the vertical continuous dryer where they are dried at 140 C deg for 12 hours using a dehumidified hot air stream based on two batteries of molecular sieves, followed by electrical heaters.

3.4.1.2. Then the flakes come in the hopper of extruder passing the next stages :

- melting at 270-290 C deg
- filtration to remove the mechanical contamination
- spinning, where the filaments are born and cooled down through 8 spinning positions at each extruder(consisting in metering pump, spin pack, quenching device)
- filaments are gathered into spun tow(=cable of filaments)by take up system, two sets, each one set for 24 spinning positions. During this operation the filaments are treated with spin finish to remove the static charges
- lay down in tow cans by sun flower gear wheels and can traverse system, two sets each one for 24 spinning positions

3.4.2. Part II Finishing.

Fiber line from Urziceni is designed to produce solid fiber of 1-17 dtex cotton type (1.3-1.7dtex) and wool type(3.3-17 dtex) and has the capacity 90 tons/day

To perform this the filaments are processed on the following equipment :

- creel ;
- 6 rollers tow guiding group ;
- prewashing bath;
- first drawing group;
- drawing bath;
- second drawing group;
- steam box; annealer;
- tow stacker;
- crimper;
- relaxer;
- cutting machine;
- baler.

The cans with spun tow are grouped in sets of 48-52 pieces reaching a global titer of 4200000 dtex that are processed together and passing the following operations.

- take it out from cans and guiding on a special metallic device, the creel, to form a wide tow of 1.2 m
- guiding of the tow on a guiding group composed of 6 rollers
- prewashing to remove the old spin finish
- first drawing stage between drawing groups no 1 and 2 where the filaments are stretched 2.6-2.8 times.

Between these groups the filaments pass under immersion through a drawing bath where they are heated at 70 C deg and treated with antistatic finish oil

- second drawing stage between group no 2 and annealer (= calender consisting in three sets of 6 rollers each) ; the drawing ratio is 1.01-1.10

During these stages are decided the mechanical properties of the fiber : tenacity, elongation and fineness(dtex)

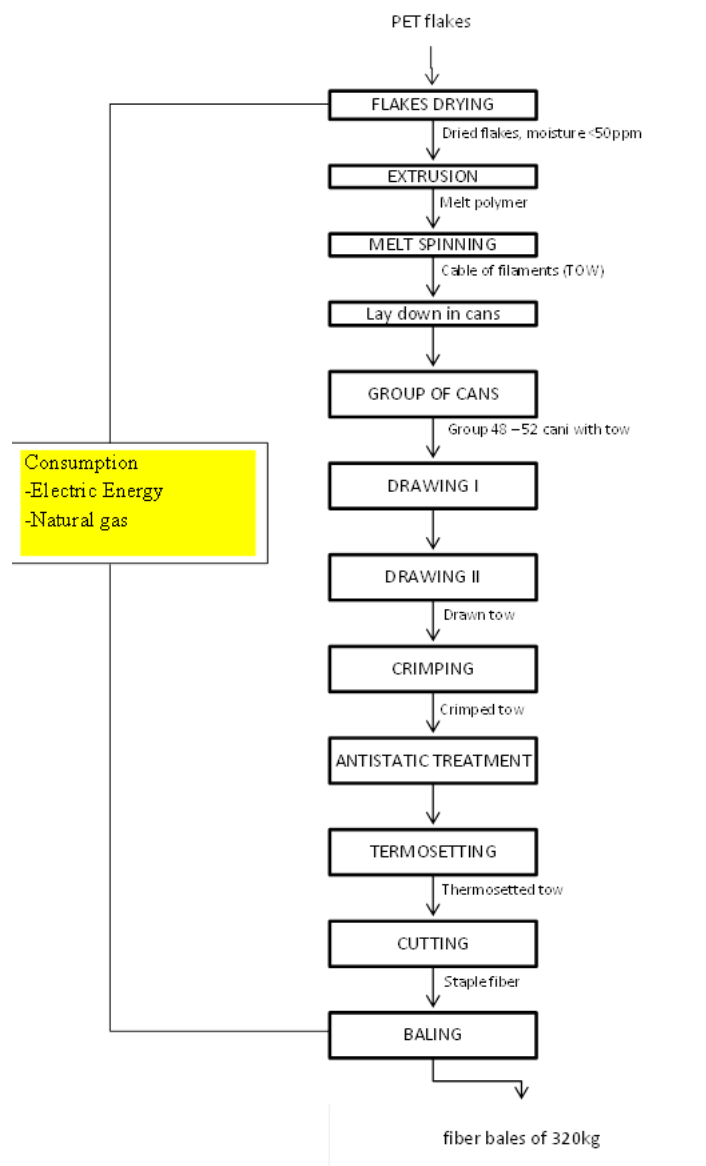
- crimping, to get the ondulations similar to natural fibers ; in front of the crimper there is the small steam box where the filaments are heated
- final antistatic treatment (according to the end use at customer)by spraying after crimper
- thermosetting, where the crimped tow is dried and relaxed to get the desired thermal properties (shrinkage, resilience)
- cutting at the desired length according to final application
- baling in bales of 320 kg each, with sizes of 120 x 110 x 70 cm

Pictures from the fiber production process can be seen below:





Table 4. PET Recycling Process from Flakes to PET Recycled Fiber



A.4. Parties and project participants

Party involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Party A (host Party) Romania	Private entity A Greentech S.A.	No

A.5. Public funding of project activity

The Project activity has received public funding from Romanian Ministry of European Funds under the financial program POS CCE “The growth of economic competitiveness”

Greentech S.A. signed the financing agreement 5IM/054 with the Romanian Ministry of European Funds on 20th August 2015 for the project titled “The Development of S.C. Greentech S.A. through the acquisition of new equipment”, cod SMIS 57035.

The duration of the financing agreement was 5 months from 20th August 2015 until 31st December 2015, and the implementation started from the next day of the signature of the agreement.

More information of the financing agreement can be found here:

<http://www.proiecteue.ro/proiecte.php?proiect=7923>

A.6. History of project activity

The proposed Project activity is neither registered as a CDM project activity, nor included as a component project activity (CPA) in a registered CDM programme of activities (PoA).

The proposed Project activity is not a project activity that has been deregistered.

A.7. Debundling

The Project activity is not a debundled component of a large-scale project activity in accordance with the applicable provisions in the “Methodological tool: Assessment of debundling for SSC project activities”.

The Project activity consists of independent activities, which include PET recycling processes from flakes to PET recycled pellets food grade for PET bottles, PET recycled strap, and PET recycled fiber.

SECTION B. Application of selected methodologies and standardized baselines

B.1. Reference of methodologies and standardized baselines

This project uses the existing small scale CDM methodology AMS-III.AJ. Recovery and recycling of materials from solid wastes. Version 06.0.

This methodology covers the emissions reductions associated with the production of high density polyethylene (HDPE), low density polyethylene (LDPE), Polyethylene Terephthalate (PET), Polypropylene (PP), and container glass from virgin materials, thus reducing related energy consumption.

Sectoral Scope: 13. Waste handling and disposal

It is assumed that baseline emissions include emissions associated with energy consumption for the production of PET pellets from virgin plastic materials.

The emission factors used in calculation are the followings:

1. The emission factors for electricity and natural gas consumption: “The technical annex to the instructions regarding SEAP model. Emissions Factors”², issued by the Convention of the municipalities on local renewable energy.
2. Emission factors for fossil fuels: “List of the national values for the emission factors and net calorific values, specific to each type of fuel and type of activity - values are determined based on EU-ETS reports from 2012”³.

² The technical annex with the emissions factors can be found at:
www.soglasheniemerov.eu/IMG/pdf/technical_annex_ro.pdf

³ http://www.mmediu.ro/app/webroot/uploads/files/2014-03-18_Lista_valorilor_nationale_FE_PCN-2014.pdf

B.2. Applicability of methodologies and standardized baselines

The Project applies the small scale CDM methodology AMS-III.AJ. Recovery and recycling of materials from solid wastes. Version 06.0.

The methodology comprises activities for the recovery and recycling of materials in municipal solid waste (MSW) to process them into intermediate or finished products, displacing the production of virgin materials in dedicated facilities, thereby resulting in avoidance of energy use.

This Project comprises activities for the recovery and recycling of materials in municipal solid waste (MSW) to process them into intermediate and finished products (R-PET, PET strap, and PET fiber), displacing the production of virgin materials in dedicated facilities, thereby resulting in avoidance of energy use.

The methodology covers the emissions associated with:

- a) Production of virgin pellets of plastics consisting of either high density polyethylene (HDPE), low density polyethylene (LDPE), Polyethylene Terephthalate (PET) or Polypropylene (PP). For the sake of this methodology, “plastic” means HDPE, LDPE, PET and PP, unless otherwise specified;
- b) Production of container glass using virgin input (“container glass” hereafter) that is displaced by the recycled container glass (“container glass cullet” hereafter) due to the project activity;
- c) Production of metals (i.e. aluminium and steel) from mined ore or virgin raw materials that is displaced by the recycled metals due to the project activity.

The Project activity is recycling PET wastes reducing energy consumption that would otherwise be required for the production of plastic made of virgin inputs for the production of plastic products, and consequently reducing greenhouse gases emissions. Therefore, the Project meets the Case a) of the emissions associated methodology, as mentioned above.

Furthermore the project activity meets all the applicability criteria as set out in the above-mentioned methodology for using recycling PET material instead of raw material, being a Case B “Greenfield facility with formal sector participation”, as explained in the following lines:

1. This methodology comprises activities for the recovery and recycling of materials in municipal solid waste (MSW) to process them into intermediate or finished products, displacing the production of virgin materials in dedicated facilities, thereby resulting in avoidance of energy use. For paper and cardboard recycling, if the baseline scenario is the decay in a disposal site, the avoided methane emissions may be claimed.	This Project comprises activities for the recovery and recycling of materials in municipal solid waste (MSW) to process them into intermediate and finished products (R-PET, PET strap, PET fiber), displacing the production of virgin materials in dedicated facilities, thereby resulting in avoidance of energy use.
2. The methodology covers the emissions associated with: (a) Production of virgin pellets of plastics consisting of either high density polyethylene (HDPE), low density polyethylene (LDPE), Polyethylene Terephthalate (PET) or Polypropylene (PP). For the sake of this methodology, “plastic” means HDPE, LDPE, PET and PP, unless otherwise specified; (b) Production of container glass using virgin input (“container glass” hereafter) that is displaced by the recycled container glass (“container glass	The Project covers the emissions associated with: (a) Production of virgin pellets of plastics consisting of Polyethylene Terephthalate (PET) (b) Not applicable (c) Not applicable

cullet" hereafter) due to the project activity; (c) Production of metals (i.e. aluminium and steel) from mined ore or virgin raw materials that is displaced by the recycled metals due to the project activity.	
3. The methodology is applicable in the following two cases Case A: Project activities that target the participation of the informal waste sector 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.	Not Applicable
4.The following applicability conditions shall apply to project activities under this case: (a) The recycling facility may be an existing facility, or a newly implemented facility.	Not Applicable
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.	Not Applicable
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 facilities that process the segregated fractions.	Not Applicable
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 agreements 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.	Not Applicable
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.	Not Applicable
9.Case B: Greenfield facility and/or capacity addition to existing facilities with formal sector	The Project is a Case B. Greenfield facility with formal sector participation.

participation In Case B, the recycling facility is owned and operated by the formal waste sector. It may receive recyclable materials from the informal waste sector, but has no participation of the informal sector in its organization or management functions. The following applicability conditions shall apply under this case.	The Project is owned and operated by the formal sector and there is no participation of the informal sectors in its organization or management functions.
10. If the recycling facility is an existing activity, the average data on the amount of recycled materials from the previous three years of operation (a minimum of one-year data would be required if the facility is less than three years old) shall be used for the estimation of the baseline recycling activity, and project activity shall consist of the increase of the recycling capacity above this level. If the recycling facility is newly implemented as a Greenfield activity, all recycled materials are eligible for the emission reduction calculation. However, in this case the project participants shall demonstrate that the materials recycled by the project activity are not diverted from other existing recycling facilities belonging to the formal sector, or, alternatively, that it is not a common practice in the region to recover and recycle these materials from municipal solid waste streams by means of formal businesses.	The recycling facility is a Greenfield activity, and thus all recycled materials have been considered eligible for the emission reduction calculation. The project proponent has demonstrated that the materials recycled (PET bottles) have not been diverted from other existing recycling facilities belonging to the formal sector. Moreover, there is not a common practice in the region to recover and recycle these materials from municipal solid waste streams by means of formal businesses, as proved by the letters from the Ministry of Economy no. 251812 from 10.07.2017 and no. 221577 from 08.08.2018, which show that the Project developer is the single producer of R-PET, PET strap, and PET fiber from Muntenia region.
11. It is possible to directly measure and record the final output of the recycling facility and the input to the final processing/manufacturing facilities, that is the weight of materials leaving the recycling facility and of those entering the processing/manufacturing facilities (on a dry basis), segregated by type.	The Project directly measures and records the final output of the recycling facility, that is the weight of materials leaving the recycling facility (on a dry basis), segregated by type (R-PET, PET strap, and PET fiber) using calibrated balances.
12. The recycled materials shall be sold directly to a processing/manufacturing facility, or to a chain of intermediary retailers that are able to transfer the recycled materials to a final identifiable processing/manufacturing facility.	PET 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 facilities.
13. The PDD shall explain how procedures, such as contractual agreements, shall be put in place to eliminate double counting of emission reductions, for example potentially resulting from waste pickers, the recycling facility or the processing/manufacturing facility, or other parties possibly claiming credits for emissions reduction. Similarly, through contractual agreement and other means, 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.	Contractual agreements have been signed to eliminate double counting of emissions reductions and they are made available at the validation of this Project and prove that the materials supplied from the recycling facility are used for processing/manufacturing.
14. For recycling of PET/PP, the project participants shall demonstrate the chemical equivalence of the recycled PET/PP to that of PET/PP made from	Documents have been made available at validation of the Project which prove that the chemical equivalence of the recycled PET to

virgin inputs by the comparison of intrinsic viscosities to ensure that the recycled PET/PP replaces virgin inputs.	that of PET made from virgin inputs by the comparison of intrinsic viscosities.
15. Emission reductions can only be claimed for the difference in energy use for the production of finished products from virgin inputs versus production from recycled materials. In the case of paper or cardboards, emissions reductions due to avoidance of methane formation in anaerobic decay may be claimed, if the baseline scenario is waste disposal in a disposal site without methane recovery.	The Project emission reductions are based only on the energy saving associated with the recycling of PET wastes.
16. Applicability conditions for both cases i.e. Case A and Case B 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, PP, steel aluminium, 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 expected to be the end products produced from materials recycled as part of the project activity.	The Project proponent has demonstrated, using three years historic data, prior to the start date of the project, that the finished product (strap) were manufactured in Romania using virgin raw materials produced in country, and documents have been made available at validation to prove it.
17. 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 (Bi) as described under the baseline section below.	The Project proponent has chosen to adjust the baseline emissions by using the baseline correction factor (Bi=1), as described under the baseline section of the methodology.
18. The recycling facility shall source its materials from MSW; materials from an unknown 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 local community, 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 not be delivered to the baseline disposal site and/or treatment plant (e.g. incineration) are not eligible.	The Project recycling facility sources its materials from MSW; materials from an unknown 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. The Project activity does not involve the collection of wastes on a door to door basis, or collection at recipient's containers for the voluntary dispensing of wastes by the local community, 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.
19. In the specific case of metals, the methodology excludes collection of the scraps generated from	Not Applicable

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 ⁶ . 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.	
20. The amount of fuel and electricity consumed by the recycling facility can be measured and recorded.	The amount of fuel and electricity consumed by the recycling facility is measured and recorded and invoices are regularly checked.
21. Project proponents shall demonstrate that the properties of the materials produced from waste recycling are the same as 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.	Documents have been made available at validation of the Project. These documents prove that the properties of the PET recycled materials produced are comparable according to standard testing methods for each material (R-PET, PET Strap, PET fiber) as those from virgin material.
22. Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 ktCO ₂ equivalent annually.	Aggregate emission reductions are less than 60 ktCO ₂ equivalent annually. This is demonstrated in the ex-ante estimations in section B.6.4 of this PDD.

B.3. Project boundary, sources and greenhouse gases (GHGs)

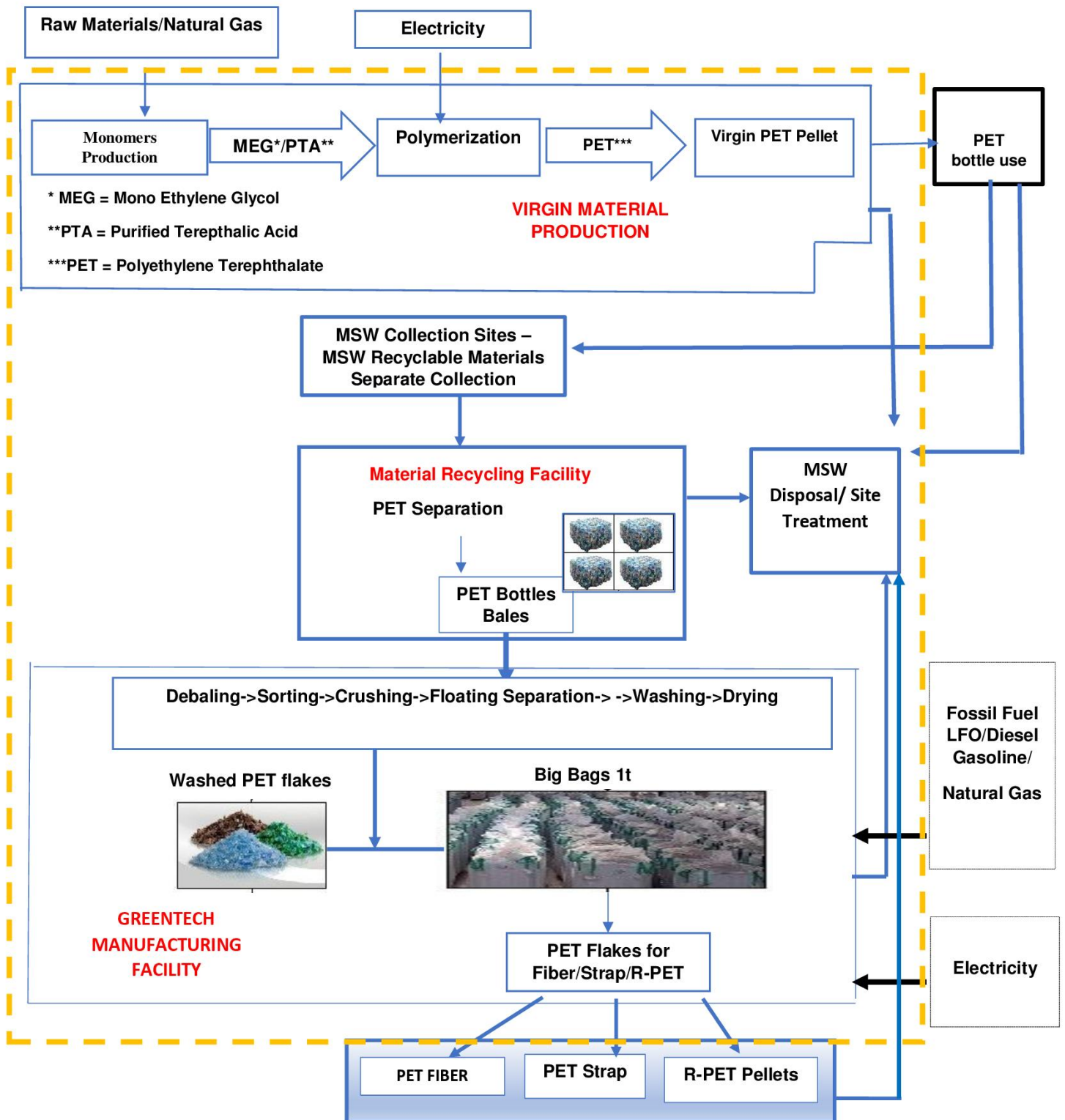
According to the methodology, the project boundary includes the physical geographical sites of:

- (a) Waste collection sites (e.g. door-to-door collection);
- (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 diagram presents the project boundary and the process involved:

Project Boundaries



Source		GHG	Included	Justification/Explanation
Baseline	Electricity Consumption	CO ₂	Y	1.11 MWh/t; 0.701 t CO ₂ /MWh
	Natural Gas Consumption	CO ₂	Y	15 GJ/t; 0.202 t CO ₂ /MWh
Project activity	Electricity Consumption	CO ₂	Y	0.701 t CO ₂ / MWh
	Natural Gas Consumption	CO ₂	Y	0.202 t CO ₂ /MWh
	Diesel Consumption	CO ₂	Y	73.56 Kg CO ₂ /GJ
	LFO Consumption	CO ₂	Y	74.08 Kg CO ₂ /GJ
	Gasoline (Benzine) Consumption	CO ₂	Y	71.62 Kg CO ₂ /GJ

Fossil Fuel Net Calorific Value:

Diesel, UM = 1 liter => 0.85 kg => 10,210kcal/kg = 11.872 kW/kg;

LFO, UM = 1Kg => 9,600kcal / kg => 11.15kW/kg;

Gasoline, UM = 1 liter => 0.75 kg => 10,755kcal/kg = 12.5kW/kg.

B.4. Establishment and description of baseline scenario

According to the methodology, the baseline scenario includes emissions associated for the production of plastic, associated with energy consumption for the production of plastic pellets from virgin plastic materials.

It is, therefore, considered that baseline emissions include emissions associated with energy consumption for the production of PET pellets from virgin plastic materials.

The emission factors used in calculation are explained in detailed in the section B1 and the baseline emissions are mentioned in B.6.2.

B.5. Demonstration of additionality

The additionality of the Project is demonstrated using the last versions of CDM Methodological Tool01: "Tool for the demonstration and assessment of additionality", version 07.0.0. The tool provides a step-wise approach to demonstrate and assess the additionality.

These steps are:

- (a) Step 0 Demonstration whether the proposed project activity is the first-of-its-kind;
- (b) Step 1 Identification of alternatives to the project activity;
- (c) Step 2 Investment analysis;
- (d) Step 3 Barriers analysis; and
- (e) Step 4 Common practice analysis.

The additionality for the project activity has been assessed in stepwise manner:-

(a) Step 0

The first of its kind has been demonstrated in line with the Methodological Tool23: "Additionality of first-of-its-kind project activities", version 03.0.

In the case that the proposed project activity is the first-of-its-kind, the Project is additional, according to Figure 1 "Flowchart of the step-wise approach"⁴, from the above mentioned CDM Methodological Tool01.

The Project uses the CDM Methodological Tool23: "Additionality of first-of-its-kind project

⁴ CDM Methodological Tool23: "Additionality of first-of-its-kind project activities", version 03.0, page 6

activities", version 03.0. This methodological tool is applicable to the Project since Green Group's project uses CDM versions of baseline and monitoring methodologies, including the CDM Methodological Tool01: "Tool for the demonstration and assessment of additionality, version 07.0.0", which allow using the "first-of-its-kind" approach for demonstrating additionality.⁵

According to Tool23 Methodological tool: "Additionality of first-of-its-kind project activities", version 03.0, the proposed project activity is the first of its kind in the applicable geographical area if: *"The project is the first in the applicable geographical area that applies a technology that is different from technologies that are implemented by any other project, which are able to deliver the same output and have started commercial operation in the applicable geographical area before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of the proposed project activity, whichever is earlier"*.

Applicable geographical area: The applicable geographical area for the demonstration of first of its kind activity has been taken as Muntenia, which is one of the main four historical provinces of Romania, located in the South part of the country. The applicable geographical area has not been considered the whole host country since Muntenia is one of the least developed regions of Romania except Bucharest, and comprises a vast area of counties, including 10 administrative units: Argeş, Brăila, Buzău, Călăraşi, Dâmboviţa, Giurgiu, Ialomiţa, Ilfov, Prahova, Teleorman. At the same time, PET bottle collection has been done on a large proportion in Muntenia since transport costs can be very expensive on longer distances, and negatively influence the efficiency of the Project.

Measure: The applicable measure is switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies.

Output: PET products has been considered as outputs, as per the applicable methodology.

Different technologies: Any technology that delivers same output (PET products) but differs by at least one of the following is considered as different technology:

(a) Energy source: Not applicable in the present case

(b) Feed stock: Not applicable in the present case

(c) Size of installation / energy savings.

PET Recycling technology is a different technology from the technology of PET production from virgin material, conducting to energy savings, which is scientifically recognised by all international and national associations and institutes in this field.

The first of its kind criteria should be demonstrated before the start date of the proposed project activity.

As per GS toolkit version 2.2, the start date of the project is the earliest date at which either the implementation or construction or real action of a project begins. The Project's first tender for the technology line PET 1 R-PET line was on 19th October 2012 (the start date), and then it started the commissioning and tests of the R-PET line from PET post consumed bottles on 18th August 2014, and began commercial operation on 27th October 2014, in line with its Environment Authorisation no. 233/27.10.2014.

Therefore, the Project start date is 19th October 2012, and first of its kind criteria has been demonstrated accordingly.

There are not any other PET recycling companies in Muntenia, which started construction or implementation before the Project start date, as confirmed by the letters of the Romanian Ministry of Economy no. 251812 from 10.07.2017 and no. 221577 from 08.08.2018. (Appendix 8.2).

⁵ Ibidem 4, page 2.

Moreover, at the present time, the Project is the only one developing a standing activity in Romania, producing R-PET, and PET strap, since the sole two companies⁶ which tried to activate in the PET recycling field declared insolvency in 2009 and 2015 due to financial problems and lack of other sources of revenues, and it is also the single producer of PET fiber from Muntenia region, as confirmed by the letters mentioned above.

In conclusion, the analysis presented above demonstrates that the proposed project activity is the first of its kind in the selected geographical region that applies a technology that is different from any other technologies able to deliver the same output, and that have started commercial operation in Muntenia before the start date of the project.

Outcome of Step 0: The proposed project is the first-of-its-kind and as per “Tool for the demonstration and assessment of additionality” version 7.0.0, the additionality is demonstrated. Hence, there is no need to proceed to Step 1 and the other steps.

From the positive outcome of step 0, as documented above, it can be concluded, that the proposed project is additional.

Prior Consideration

As per the requirements for demonstration of the additionality (PDD_ver. 10.1):^[SEP] *If the start date of the project activity is prior to the date of publication of the PDD for the global stakeholder consultation, provide evidence of the prior consideration of the CDM in accordance with applicable provisions related to the demonstration of prior consideration of the CDM in the Project standard*^[SEP]

The Project applies for retroactive registration under the Gold Standard, and therefore the CDM rules from CDM validation and verification standard on prior consideration of the carbon revenues apply in this project.

The Start date of the Project is 19th October 2012.

The opportunity to generate additional revenues from the project's GHG emission reductions to render the project economically attractive was investigated since 9th July 2012, when the CEO released a decision⁷ to investigate the possibility to acquire carbon revenues from the recycling project. From that date, continuous efforts and actions⁸ have been done in order to obtain CO2 credits revenues. A list of actions done to acquire carbon credits prior to the start date of the Project until the approval of the pre-feasibility study by Gold Standard (GS) has been included in the PDD in the Appendix 8.1.

In 2012 and 2013, informal discussions and consultations started within Greentech assigned team for the project certification and with consultants specialized in CO2 related issues regarding the possibilities of obtaining revenues from carbon certificates. After these consultations, Greentech required and obtained a budget with estimated revenues and expenditures from such a certified CO2 project⁹.

⁶ Esox Prodplast Srl. from Caracal, Dobrogea province, declared insolvency on 17 February 2009, Source of date: Romanian Ministry of Justice, portal.just.ro

M-Unit Plast Srl. from Constanta, Dobrogea province declared insolvency on 19 February 2015, Source of date: Romanian Ministry of Justice, portal.just.ro

⁷ Appendix 8.3, the CEO decision from 9th July 2012 to investigate the possibility to acquire carbon revenues from the recycling project

⁸ Appendix 8.1 shows the list of actions (completed by documentation made available to the auditor) done to acquire carbon credits prior to the start date of the Project until the Project passed the pre-feasibility study of Gold Standard together with the main development stages of R-PET, strap, and fiber production lines.

⁹ Document estimating CO2 revenues and expenditures from Appendix 8.1 has been made available at the

Taking into consideration the positive outcome of the project's CO2 saving estimations based on the opportunity to generate carbon credit revenues, Greentech signed a consultancy agreement on 18th November 2013¹⁰ with the independent consultant Fometescu Casiana Irina I.I., aiming at developing a CO2 voluntary carbon project, which is on-going since then.

The company applied for the opening of the Project Developer account into the Gold Standard Registry on 28th March 2014, sent a statement letter to the Registry on 23rd May 2014 (Appendix 8.4), and this account was active since 16th July 2014. Since then, working on the Project has been continuously done, including discussions and consultations with both international organizations, such as the standard organization GS and Markit, and national institutions, the Pre-Feasibility Assessment by GS has also started and have been successfully passed.

On 22nd January 2015 GS updated "Revision in the rules and requirements for Prior Consideration of Carbon Revenues for GS-VER projects", and point III states the following: "In order to be eligible under Gold Standard a retroactive project must submit the required documents to Gold Standard (time of first submission) within one year of its start date. Project documents submitted at a date later than one year from the project start date will not be eligible for Gold Standard certification. These requirements are applicable for projects that have a date of first submission on or after 1st June 2015."

The PP asked on 10th August 2016 for a clarification regarding the rule mentioned above, and GS send a positive reply on 22nd August 2016 that the project will be treated by GS based on earlier guidelines, i.e. the CDM guidelines since Greentech and GS were in contact for this project since mid-2014, which is before the release of this updated rule on prior consideration in January 2015.¹¹

Consequently, the PP focused to demonstrate the carbon revenues consideration prior to the start date of the project and continuous actions that have been taken in order to receive carbon revenues, according to the CDM guidelines. Appendix 8.1 from the PDD shows the list of actions, completed by documentation made available to the auditor, done to acquire carbon credits prior to the start date of the Project until the Project passed the pre-feasibility study of Gold Standard together with the main development stages of R-PET, strap, and fiber production lines.

The Project faced some difficulties regarding the uncertainty of AAUs and the possibility of developing a project with Gold Standard in Romania because of double counting rules, which delayed writing the first draft of the PDD.

Moreover, in order to get institutional support for the project in its GHG reduction plans, including AAUs retirement by the Romanian authorities, several informal consultations were taken in 2014 with different public institutions: Ministry of Environment – Climate Change Department, Ministry of Economy – Energy Department, National Carbon Registry.

At the same time, the project developer signed another consultancy agreement¹² on 1st January 2015 with the independent consultant, Mihai Solea, for the calculation of GHG baseline emissions and CO2 savings, according with the applicable methodology.

The Gold Standard guideline on double counting, version 1.0 was issued on November 2015, and the Project became viable, having different alternatives to proceed on the AAUs topic. The PP has

validation.

¹⁰ The consultancy agreements have been made available at the validation of the Project.

¹¹ The following documents have been submitted to the auditor in order to prove the acceptance of the project to be treated based on earlier guidelines than the updated GS rule from January 2015.

1. E-mail from Greentech's consultant to GS dated on 10th August 2016 regarding the clarification of the rule
2. E-mail from GS dated on 22nd August 2016 regarding the acceptance of the project to be treated based on earlier guidelines.

¹² Ibidem 10.

decided to continue with the project registration having in mind these new approved GS options to avoid double counting.

Moreover, the issue of the AAUs retirement was discussed by the PP with the Romanian Environment Ministry during the Project public consultation process in October and November 2017, and the PP started an official correspondence with the Ministry on 26th October 2017. The detailed correspondence with the Ministry has been inserted into the GS Passport pages 21 to 24.

In the last letter received by the PP from the Environment Ministry (no. 35036 from 25 January 2018), it is stated that Romania does not hold any AAUs for the II commitment period of the Kyoto Protocol (2013-2020) in its national account, considering that Romania did not receive the allocation of AAU units as the Doha amendment of the Kyoto Protocol is not applicable.

The situation remains the same at the present date, the Doha amendment has not been ratified as per the UNFCCC records: <https://unfccc.int/process/the-kyoto-protocol/the-doha-amendment>, and therefore there is no risk of double counting in an Annex I country.

The PP acknowledges that, in the case of ratification of the Doha amendment of the Kyoto Protocol or other legislation changes, they shall address the rules of avoiding double counting according to the updated versions of “the Gold Standard guideline of double counting”.

In conclusion, the Project Developer was seriously taken into consideration carbon revenues prior to the start date of the Project and continuous actions have been done in order to obtain carbon revenues, which will make its activities more economically efficiently.

Furthermore, it is worth mentioning that the other two companies which produced PET products outputs in other regions of Romania declared insolvency in 2009 and 2015, due to financial reasons and lack of other sources of revenues, such as carbon credits.

The revenues from carbon credits will be used to maintain and expand the activity of the Project, including the new production lines from Frasinu and Urziceni finalised on December 2016 and October 2017. The plastic recycling activity has high importance at present times within the global context of sustainability development and millennium development goals, and carbon credits are an important source of revenue to meet these goals.

B.6. Estimation of emission reductions

B.6.1. Explanation of methodological choices

The methodology used for baseline and monitoring will be applicable for a typical recycling activity for plastic. Plastic recycled material replaces material made of virgin inputs in the manufacturing of products. These activities are limited to 60 ktCO₂e emission reductions per year.

B.6.2. Data and parameters fixed ex ante

Data/Parameter	EF_{el, CO2} ; EF_{FFCO2}
Data unit	EF _{el CO2} - tCO2/MWh for electricity generation; EF _{FFCO2} - tCO2/GJ for fossil fuel, natural gas.
Description	CO ₂ emission factor for energy consumption in the production of plastic PET pellets from virgin plastic material; CO ₂ emission factor for natural gas consumption in the production of plastic PET pellets from virgin plastic material;
Source of data	Calculated from the source: Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope: 13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials.
Value(s) applied	EF _{el CO2} = 0.701 tCO2/MWh for electricity EF _{FFCO2} = 0.202 tCO2/MWh for natural gas EF _{FFCO2} = 73.56 kgCO2/GJ for Diesel EF _{FFCO2} = 71.62 kgCO2/GJ for Gasoline EF _{FFCO2} = 74.08 kgCO2/GJ for LFO
Choice of data or measurement methods and procedures	Emission factors for electricity consumed national and European - technical annex to the SEAP template instructions; The list of the national values of the emission factors and net calorific values, specific to each type of fuel and type of activity - EU-ETS 2012 (www.anpm.ro ; www.mmediu.ro).
Purpose of data	To calculate the baseline emissions.
Additional comment	N/A

Data/Parameter	L_i
Data unit	-
Description	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material
Source of data	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope:13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials. (http://pswm.uvic.ca/wp-content/uploads/2012/05/Read-the-Publication.pdf)
Value(s) applied	0.75
Choice of data or measurement methods and procedures	From baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials; chapter 5.2 - see attached excel file
Purpose of data	To calculate the baseline emissions
Additional comment	i-Plastic includes R-PET, Strap and Fibre

Data/Parameter	SEC_{BL}
Data unit	MWh/t
Description	Specific electricity consumption at virgin PET production facility
Source of data	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope:13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials.
Value(s) applied	1.110
Choice of data or measurement methods and procedures	It is assumed that process energy for polymerization is supplied with electricity; Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope:13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials.
Purpose of data	To calculate the baseline emissions
Additional comment	N/A

Data/Parameter	SFC_{BL}
Data unit	GJ/t
Description	Specific natural gas consumption at virgin PET production facility
Source of data	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope:13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials
Value(s) applied	15
Choice of data or measurement methods and procedures	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope: 13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials. Baseline emissions
Purpose of data	To calculate the baseline emissions
Additional comment	N/A

Data/Parameter	B_i
Data unit	-
Description	Correction factor based on share of production in non-Annex I countries
Source of data	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope: 13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials. Baseline emissions
Value(s) applied	1.0
Choice of data or measurement methods and procedures	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology
Purpose of data	To calculate the baseline emissions
Additional comment	-

Data/Parameter	SEC_{P,i}
Data unit	-
Description	Energy consumption factor for processing of recycled material i in the processing/manufacturing facility
Source of data	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology Recovery and recycling of materials from solid wastes, Version 6.0, Sectoral scope: 13; Baseline methodology for emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials. Baseline emissions
Value(s) applied	0
Choice of data or measurement methods and procedures	Clean Development Mechanism AMS-III.AJ, Small-scale Methodology
Purpose of data	To calculate the baseline emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

The emission reductions achieved by the project activity will be the difference between the baseline emissions and the project emissions.

Equation (1): $ER_y = BE_y - PE_y$

Where:

ER_y: Emission reductions in year y (tCO₂)

BE_y: Baseline emissions in year y (tCO₂)

PE_y: Project emissions in year y (tCO₂)

Since MSW collected does not contain organic biogenic waste segregated in the recycling facility, no leakage calculation is required.

Baseline emissions are calculated using the following equation:

Equation (2):

$BE_y = (Q_{PET\ FLAKES}) * L_{PET} * B_i * (SEC_{BL,PET} * EF_{el\ CO_2,PET} + SFC_{BL,PET} * EF_{FFCO_2,PET})$

Where:

BE_y: Baseline emissions in year y (tCO₂/y)

Q_{PET FLAKES}: Quantity of PET FLAKES recycled in year y, (t)

L_{PET}: Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material = 0,75

EF_{elCO₂,PET}: CO₂ emission factor for energy consumption in the production of virgin PET (t CO₂/t INPUT PET Waste)

SEC_{BL,PET}: Specific electricity consumption at virgin PET production facility (MWh/t)

EF_{FFCO₂, PET}: CO₂ emission factor for natural gas consumption (tCO₂/GJ)

SFC_{BL,PET}: Specific natural gas consumption at virgin PET production facility (GJ/t)

B_i = 1

Project emissions for the monitoring report are calculated using the following equations:

As per Equation (5) of the applied methodology: PE_y = PE_{PET FLAKES,y} (tCO₂)

PE_{PET FLAKES, y} = EC_{PET flakes,y} * EF_{el,y} + FF_{LFO flakes,y} * EF_{LFO flakes,y} + FF_{diesel for flakes,y} * EF_{diesel for flakes,y} + FF_{gasoline for flakes,y} * EF_{gasoline for flakes,y} + FF_{natural gas for flakes,y} * EF_{natural gas for flakes,y} (tCO₂)

Where:

PE_y: Project emissions in year y, (tCO₂)

Where:

EC_{PET flakes,y} = Electricity consumption (production +administration) for flakes in year y, (MWh)

EF_{el,y} = Emission Factor for Electricity Generation for flakes in year y, (tCO₂/MWh)

FF_{LFO flakes,y} = Fossil fuel LFO consumption (light liquid fuel) for flakes in year y, (MWh)

EF_{LFO flakes,y} = Emission Factor for LFO for flakes in year y, (tCO₂/MWh)

FF_{diesel for flakes,y} = Fossil fuel Diesel consumption for flakes in year y, (MWh)

EF_{diesel for flakes,y} = Emission Factor for Diesel for flakes in year y, (tCO₂/MWh)

FF_{gasoline for flakes,y} = Fossil fuel gasoline consumption for flakes in year y, (MWh)

EF_{gasoline for flakes,y} = Emission Factor for gasoline for flakes in year y, (tCO₂/MWh)

FF_{natural gas for flakes,y} = Fossil fuel natural gas-consumption for flakes in year y, (MWh)

EF_{natural gas for flakes,y} = Emission Factor for natural gas for flakes in year y, (tCO₂/MWh)

1MWh = 3,6 GJ

B.6.4. Summary of ex ante estimates of emission reductions

The ex-ante estimation of baseline emissions, project emissions, leakage emissions and emission reductions in the first crediting period are expressed in the following table.

Year	Baseline emissions (t CO ₂ e)	Project emissions (t CO ₂ e)	Leakage (t CO ₂ e)	Emission reductions (t CO ₂ e)
2016	63,269.87	17,889.49	0	45,380
2017	63,269.87	17,889.49	0	45,380
2018	63,269.87	17,889.49	0	45,380
2019	63,269.87	17,889.49	0	45,380
2020	63,269.87	17,889.49	0	45,380
2021	63,269.87	17,889.49	0	45,380
2022	63,269.87	17,889.49	0	45,380
2023	63,269.87	17,889.49	0	45,380
2024	63,269.87	17,889.49	0	45,380
2025	63,269.87	17,889.49	0	45,380
Total	632,698.70	178,894.90	0	453,800

Total number of crediting years	10			
Annual average over the crediting period¹³	63,269.87	17,889.49	0	45,380

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	Q_{B PET, y}
Data unit	t/y
Description	Quantity of municipal solid waste/PET bales for flakes collected at the recycling facility in year y
Source of data	PET recycling plant
Value(s) applied	72,885.945 tonnes per year
Measurement methods and procedures	Quantity of PET bales – weight in a balance
Monitoring frequency	Monthly
QA/QC procedures	The balance is calibrated every 5 years.
Purpose of data	To calculate the baseline emissions
Additional comment	-

Data/Parameter	Q_{PET FLAKES, y}
Data unit	t/y
Description	Quantity of plastic type i recycled in year y
Source of data	PET recycling plant
Value(s) applied	52,081.155 tonnes per year
Measurement methods and procedures	Direct weighing and recording of the weight Cross-check with the mass of product(s) used at the processing/ manufacturing facility using production records
Monitoring frequency	Monthly
QA/QC procedures	The balance is calibrated every 5 years.
Purpose of data	To calculate the baseline emissions
Additional comment	Only plastic is recycled. No glass, metals involved.

Data/Parameter	EC_{PET flakes, y}
Data unit	MWh/y
Description	Electricity consumption at recycling facility for total PET flakes in year y
Source of data	Measured from the recycling plant
Value(s) applied	22,801.565 MWh per year
Measurement methods and procedures	Metering with calibrated equipment
Monitoring frequency	Continuous monthly
QA/QC procedures	The recycling plant checks completeness of invoices concerning electricity consumption. The recycling plant checks at least monthly, if consumption fit to the produces quantities. The electricity meter will be calibrated every 5 years.
Purpose of data	To calculate the baseline emissions
Additional comment	-

¹³ The crediting period has been considered: 2016 – 2025, 10 years fixed period.

Data/Parameter	FC _{i,y}
Data unit	MWh/year
Description	Fuel consumption of the recycling facility apportioned to material type i
Source of data	Measured from the recycling plant
Value(s) applied	FC _{i,y} for Natural gas =3860 MWh per year FC _{i,y} for Diesel =1825.43 MWh per year FC _{i,y} for gasoline =3.76 MWh per year FC _{i,y} for LFO =2405.46 MWh per year
Measurement methods and procedures	Metering with calibrated equipment and transformed in MWh
Monitoring frequency	Monthly
QA/QC procedures	The recycling plant checks completeness of invoices concerning fuel consumption. The recycling plant checks at least monthly, if consumption fit to the produces quantities.
Purpose of data	To calculate the project emissions
Additional comment	-

Data/Parameter	Intrinsic Viscosity
Data unit	decilitres/gram (dL/g)
Description	Intrinsic Viscosity
Source of data	The Davenport Petplu software / Internal quality reports
Value(s) applied	
Measurement methods and procedures	Test method for determining Intrinsic viscosity is as per ASTM D 4603 "Standard test method for determining Viscosity of Polyethylene Terephthalate" for PET
Monitoring frequency	Every batch of Polymerisation
QA/QC procedures	The recycling plant regularly checks the intrinsic viscosity of both R-PET, strap, and fiber;
Purpose of data	-
Additional comment	To compare the chemical equivalence

B.7.2. Sampling plan

All data used (electricity and fuel consumption, amount of PET bottles waste received and recycled PET flakes generated, etc.) will be obtained directly from the measures developed by the technical staff in the recycling plant.

The emission factors for electricity and fuel are consulted and updated through official Romanian documentation.

B.7.3. Other elements of monitoring plan

The monitoring plan will be implemented by internal technical staff in charge of the each recycling plant. The plan is made to verify that the emission reductions are real and measurable. The data needed for the emissions reduction calculations will be monitored transparently during the crediting period. The data collection will be done by internal technical staff in the recycling plants, depending on the parameter, according to the followings:

1.0 Data collected

The data to be collected are the following:

- (a) Mass of PET bottle waste entering in the recycling facility (input), measured by direct weighing;
- (b) Mass of recycled PET flakes by the recycling facility, measured by direct weighing;
- (c) Mass of R-PET, strap, and fiber (output);
- (d) Amount of electricity consumed at the recycling facility for power equipment;
- (e) Emission factor for the electrical grid system;
- (f) Amount of fossil fuel consumed.

2.0 In addition, these documents collected by the internal technical staff will be made available to DOE at verification:

- Invoices documents regarding the fuel consumed at the recycling facility;
- Electricity invoices regarding the electricity consumptions of the recycling facility from the national Grid;
- Receipts and invoices regarding purchases of the PET waste and sales of recycled products (to be collected by the technical staff in charge of the recycling plants operation).

All reports will be centrally kept by the internal staff dedicated to this project and made available to the DOE.

3.0 The data to be monitored

The set of data to be monitored during the project operation phase is provided in B.7.1.

4.0 The equipment for monitoring

The weighting system is calibrated each year. The recycling plant checks completeness of invoices concerning electricity and fossil fuel consumptions. The recycling plant checks at least monthly, if consumption fit to the produced quantities. The project proponent also checks continuously the amount of incoming and produced PET.

The company is ISO 9001:2008 certified and all weighting systems are calibrated each year according to operational procedures PO-GRT-13 and respectively PO-GF-13.

5.0 Verification and calibration of the equipment

The verification and calibration of the weighting system/scales is done by Romanian Bureau of Legal Metrology according to its own procedure.

6.0 Data Management and treatment

All data collected by Production, Technical and Purchasing department from the recycling plant and manufacturers will be centralised by themselves according to the Procedure for the control of documents PS-GF-01 and PS-GRT-01 foreseen by ISO 9001:2008.

7.0 Monitoring Report

All the data from production are monitored in monthly reports issued by the production department. This documents contains the data for input raw materials and additives, output, consumption of all utilities (electricity, gas, water, fuel etc.)

The data about energy and fuel for all production and departments as well as for administration department are centralised by the technical manager.

The internal technical staff is responsible for preparing the monitoring report under the supervision of the DOE.

All the related records of verification, reading, cross-checking will be readily accessible for the verification of the DOE.

SECTION C. Duration and crediting period

C.1. Start date of project activity

The Start Date of project activity is: 19/10/2012

Note: The Project's first tender for the acquisition of the PET1 R-PET (Recycled-PET) line was 19th October 2012, which is the start date of the project.

C.2. Expected operational lifetime of project activity

The expected operational lifetime of the project activity is 30 years.¹⁴

C.3. Crediting period of project activity

C.3.1. Type of crediting period

The CDM-PDD corresponds to a 10 year fixed period.

C.3.2. Start date of crediting period

01/01/2016

C.3.3. Duration of crediting period

10 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

The recycling of post consumer PET bottle wastes into recycled PET products (strap, fiber, chips food grade for "bottle to bottle"/R-PET) has significant effects on the protection of the environment, as follows:

1. Reduction of CO₂ emissions by 45-47% compared to the production of the above items from virgin PET;
2. Savings in electricity by 30% compared with virgin PET production;
3. Savings in fossil fuel by 75% compared with virgin PET production;
4. The environment protection (land, rivers, lakes etc.) due to PET bottle wastes collection and recycling activities.

Greentech S.A. have been carrying out its activities according with Romanian legislation, carrying out its PET recycling activities under the Environment Authorisation no. 66 from 9th April 2012 (revision 14.08.2013; revision 16.01.2014; revision 14.04.2015; revision 13.07.2016; revision 03.02.2017), and the Environment Authorization no. 233 from 27th October 2014 (revision 04.04.2016; revision 03.02.2017).

¹⁴ The document provided to the DOE for verification

GreenFiber International S.A. have been carrying out its activities according with Romanian legislation, carrying out its PET fiber recycling activities in Urziceni recycling plant under the Environment Authorisation no. 2 from 03.01.2018.

At the same time, in order to fulfil requirements for an integrated management system, Green Group sets up an ISO integrated management system, for Quality, Environment and Occupational Safety: SR EN ISO 9001:2008, SR EN ISO 14001:2005, and SR OHSAS 18001:2008 by RINA Simtex, and Oeko-Tex Standard 100 by Hohenstein Textile Testing Institute (<http://www.greentech.ro/en/certificates> and <http://www.greenfiber.ro/certificate>).

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

A stakeholder feedback round has been organised and the PDD and Passport drafts have been sent to the identified stakeholders.

The Stakeholder Feedback Round (SFR) has been planned from 7th July 2017. The email has been sent on 24th October 2017 to relevant stakeholders like local official representatives, local people impacted by the project, local NGOs, Gold Standard officials, and NGOs supporting Gold Standard, along with project documents (GS Passport and PDD).

The process for the SFR has been conducted as follows:

- E-mail sent to relevant stakeholders
- The non-technical summary of project activity along with Registered PDD,
- draft GS Passport, GS Public view section web link submission to relevant
- stakeholders.
- Grievance Mechanism Feedback/Questions from Stakeholders
- Answers for questions received from stakeholders during online SFR
- process.

Identification of Stakeholders:

The Stakeholder feedback round has been planned to consider and received feedback from the possible stakeholders to the project, i.e. local NGOs, local official representatives. Apart from these, the stakeholders as agreed by the Gold Standard representative, i.e. Gold Standard partnered NGOs in Romania.

The Stakeholders identified can be seen in the following table:

No	Name	Organization	Position	E-mail
1	Neha Rao	Gold Standard	Project Coordinator	ga@goldstandard.org neha.rao@goldstandard.org
2	Madalina Corciu	WWF Romania	Communication Coordinator	office@wwfdcp.ro
3	Irina Bandrabur	Greenpeace Romania	Communication Coordinator	irina.bandrabur@greenpeace.org
4	Emanoil Neagu	Buzau County Council	President	president@cjbuzau.ro
5	Dimciu Valeriu	Unemployment Office Buzau	Deputy Executive Manager	vdimciu@ajofmbuzau.ro
6	Alexandra Irimiea	Foreign Investors Council Romania	Junior Project Manager	alexandra.irimiea@fic.ro
7	Constantin Toma	Buzau City Hall	Mayor	primar.toma@primariabuzau.ro

8	Stoica Aurel	Tintesti City Hall	Mayor	primariatintesti@yahoo.com
9	Doina Alexe	RINA Simtex	Chief auditor	doina.alex@rina.org
10	Sergiu Cruceanu	The Ministry of the Environment, Waters and Forestry	Head of the Climate Change Service	sergiu.cruceanu@mmediu.ro

The Stakeholder Feedback Round has been done by online method. Email invitations were sent to GS partnered NGO's and the identified stakeholders on 24th October 2017. A follow up e-mail was sent on 22 December 2017 to the stakeholders who did not respond. E-mails were received from few stakeholders and will be detailed below. The relevant documents of project activity like draft GS Passport, and PDD were made available during Stakeholder Feedback Round. The public notices were posted at the pan chart offices of Buzau plant.

E.2. Summary of comments received

Comments from the SFR were received from the following stakeholders: Petre Emanoil Neagu - President of Buzau County Council, Valeriu Dimciu - Deputy Executive Manager Unemployment Office Buzau, Doina Alexe - ISO auditor at RINA SIMTEX, Sergiu Cruceanu - Romanian Environment Ministry representative.

Their e-mails in Romanian are copied in the GS Passport page 16 to 20 together with the English translations. The respondents acknowledged the receipt of the documentation sent, congratulate the PP for its activity, and noted the importance of the recycling activity in contributing to protecting the environment and saving CO2 emissions, as well as to the economic and social development of the region.

There was also one meeting with the Romanian Environment Ministry representatives from the Climate Change Department on 26 October 2017, and the discussions held at the Ministry location in Bucharest were very important for the Project, especially from the AAUs point of view.

E.3. Report on consideration of comments received

The detailed report on the SFR comments can be found in Gold Standard Passport from page 14 to 25.

SECTION F. Approval and authorization

Not required

Appendix 1. Contact information of project participants

Organization name	Greentech S.A.
Country	Romania
Address	Aleea Industriilor nr. 17, Buzau, 120224
Telephone	004 0238 725 759
Fax	004 0238 725 759
E-mail	office@greentech.ro
Website	www.greentech.ro
Contact person	Alina Genes

Organization name	Carbon Expert
Country	Romania
Address	Calea Plevnei 145 B, 3081, Bucharest, 060012
Telephone	004 0744760710
Fax	-
E-mail	casiana@carbonexpert.ro
Website	www.carbonexpert.ro
Contact person	Casiana Fometescu

Organization name	Solea Mihai Florin PFA
Country	Romania
Address	Bratului 8-10, sector 2, Bucharest, Romania
Telephone	004 0787857149
Fax	-
E-mail	mihaisolea@gmail.com
Website	
Contact person	Mihai Florin Solea

Appendix 2. Affirmation regarding public funding

Information on public funding has been included in the PDD, section A5.

Declaration regarding Official Development Assistance (ODA) has been included in Gold Standard Passport, page 62-63.

Appendix 3. Applicability of methodologies and standardized baselines

Information on the applicability of the methodology and the baseline development has been included in the PDD, section B.2.

Appendix 4. Further background information on ex ante calculation of emission reductions

Information on ex ante calculation of emissions reductions has been included in the PDD, section B.6.3.

Appendix 5. Further background information on monitoring plan

Information on monitoring plan has been included in the PDD, section B.7.3.

Appendix 6. Summary report of comments received from local stakeholders

The detailed report on the SFR comments has been included in Gold Standard Passport from page 14 to 25.

Appendix 7. Summary of post-registration changes

Not applicable

Appendix 8 Others

List of main development stages of Greentech for both R-PET, strap, and fiber production and list of actions done to acquire carbon credits prior to the start date of the Project until the Project passed the pre-feasibility study of Gold Standard.

Letters from the Romanian Ministry of Economy no. 251812 from 10th July 2017 and no. 221577 from 8th August 2018 regarding the first PET recycling activities developed by Greentech in Muntenia

CEO Decision from 9th July 2012 to investigate the possibility to acquire carbon revenues from the recycling project

Company statement letter to Gold Standard Registry, dated 23th May 2014.