Chint New Energy Technology Co., Ltd.

ENVIRONMENTAL PRODUCT DECLARATION

PRODUCT NAME

CHSM72M-HC, CHSM72M(DG)/F-BH, CHSM54M-HC, CHSM54M(BL)-HC

PLANTS

No. 1 Jisheng Road, Jianshan New Zone, Haining, Zhejiang, 314415 P. R. China.

in compliance with ISO 14025 + EN 50693

Program Operator	UL
Publisher	EPDItaly

Declaration Number	4790439182.101.1
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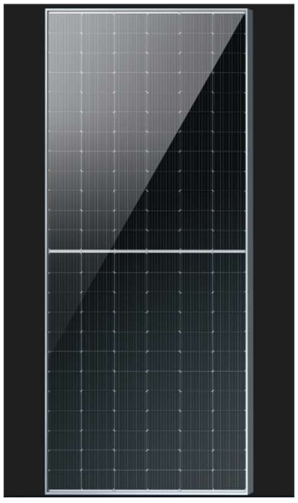

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ENVIRONMENTAL PRODUCT DECLARATION

CHSM72M-HC, CHSM72M(DG)/F-BH, CHSM54M-HC, CHSM54M(BL)-HC

ASTRONERGY

Astronergy is committed to being the most competitive photovoltaic modules supplier in the world, focusing on the R&D, production and sales of high-efficient crystalline silicon solar cells and modules, with the representative products of ASTRO series of high-efficient modules. At present the company has deployed intelligent manufacturing bases in Haining in Zhejiang, Yancheng in Jiangsu, Jiuquan in Gansu, Songyuan in Jilin, and Thailand.

For a reliable and technology-leading brand, Astronergy has won the honor of PVEL/DNV GL "Top Performer" top module manufacturer for six times, and has been listed as the world's first-tier supplier of photovoltaic modules by Bloomberg, an international authoritative financial company, for many times.

For more information visit:
www.astro-energy.com

ENVIRONMENTAL PRODUCT DECLARATION

ASTRONERGY

CHSM72M-HC, CHSM72M(DG)/F-BH, CHSM54M-HC, CHSM54M(BL)-HC

According to ISO 14025,
BS EN 50693:2019, and EN 15804:2012+A2:2019

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Environment 333 Pfingsten Rd, Northbrook, IL 60062 www.ul.com www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v 2.7 2022
MANUFACTURER NAME AND ADDRESS	EPD Owner: Chint New Energy Technology Co., Ltd. No.1 Jisheng Road, Jianshan New Zone, Haining, Zhejiang Province, P. R. China. Manufacturer: Chint New Energy Technology (Yancheng) Co.,Ltd. No.1 Tonghui Road, Dafeng District, Yancheng City, Jiangsu Province, P. R. China
DECLARATION NUMBER	4790439182.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	CHSM72M-HC, CHSM72M(DG)/F-BH, CHSM54M-HC, CHSM54M(BL)-HC 1 kWh of electricity generated as output from the solar photovoltaic plant
REFERENCE PCR AND VERSION NUMBER	PCR EPDItaly014: Electricity Produced by Photovoltaic Modules.
DESCRIPTION OF PRODUCT APPLICATION/USE	Astronergy mono-crystalline silicon PV modules are widely used to generate electricity on rooftop and ground solar farms.
PRODUCT RSL DESCRIPTION (IF APPL.)	30 years
MARKETS OF APPLICABILITY	Global
DATE OF ISSUE	March 1, 2023
PERIOD OF VALIDITY	5 Years
EPD TYPE	product-specific
RANGE OF DATASET VARIABILITY	Industry-average
EPD SCOPE	cradle to grave
YEAR(S) OF REPORTED PRIMARY DATA	November 2021—April 2022
LCA SOFTWARE & VERSION NUMBER	SimaPro 9.2
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent 3.7
LCIA METHODOLOGY & VERSION NUMBER	EN 15804+A2:2019

The PCR review was conducted by:	EPDItaly PCR Review Panel info@epditaly.it
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Under the CHINT Group, Astronergy is an intelligent manufacturing enterprise focusing on photovoltaic modules. Founded in 2006, Astronergy is one of the earliest private enterprises to set foot in the PV field, its business footprints are all over 140 countries and regions in the world. Astronergy is committed to being the most competitive photovoltaic modules supplier worldwide with its mission of creating a sustainable and net-zero carbon world with solar power. Focusing on R&D, production and sales of high-efficiency crystalline silicon PV cells and PV modules, with intelligent manufacturing bases at Haining in Zhejiang, Yancheng in Jiangsu, Jiuquan in Gansu, Songyuan in Jilin and in Thailand. By the end of 2022, Astronergy's PV cell capacity is 13GW, and PV module capacity is 20GW. By 2025, Astronergy's PV cell capacity will reach 78GW, and PV module capacity will reach 90GW.

1.2. Product Description

1.2.1 Product Identification

Astronergy strengthens technological innovation and R&D investment, and continues to launch ASTRO series of high-efficient modules, covering ASTRO monocrystalline bifacial series and ASTRO monocrystalline mono-facial series, using a number of advanced photovoltaic technologies such as large-format silicon wafers, half-cutting, MBB, non-destructive cutting to increase module power and efficiency, and have obtained certifications in many mainstream markets including China, Europe, Australia, Japan, South Korea, Israel, Brazil, the United States, etc., with metrics reaching the international first-class level. With a reliable and technology-leading brand, Astronergy has won the honor of PVEL/DNV GL "Top Performer" top module manufacturer for six times, and has been listed as the world's Tier 1 supplier of photovoltaic modules by Bloomberg, an international authoritative financial company, for many times.

Figure 1 Astronergy's PV modules

1.2.2 Product Specification

Within this project, 7 product models of PV modules are analyzed, which are listed in Table 1.

Table 1 Different PV module products series and models

Product Model	Power output range (W)	Dimensions(mm)	Module efficiency (%)
CHSM72M-HC	530-560	2256x1133x35	21.9
CHSM72M-HC	540-560	2278x1134x35	21.68
CHSM72M-HC	540-560	2278x1134x30	21.68
CHSM72M(DG)/F-BH	535-555	2256x1133x35	21.71
CHSM72M(DG)/F-BH	535-555	2278x1134x35	21.48
CHSM54M(BL)-HC	395-420	1708x1133x30	21.7
CHSM54M-HC	395-420	1708x1133x30	21.7

Note: CHSM: CHINT Solar Module; 72/54: Number of solar cells; M: Mono-Si solar cells; DG: Double-glass module; F: Frame; BL: Black; HC: Half-cut solar cells; BH: Bifacial Half-cut module.

1.3. Application

Astronergy's PV modules are widely used to generate electricity on rooftop and ground solar farms.

1.4. Material Composition

Table 2 contains a list of materials and substances in different modules.

Table 2 Components in different PV modules

Materials	Units	CHSM54M-HC	CHSM54M (BL)-HC	CHSM72M (DG)/F-BH	CHSM72M (DG)/F-BH	CHSM72M-HC	CHSM72M-HC	CHSM72M-HC
		1708x1133x 30 mm	1708x1133x 30 mm	2256x1133x 35 mm	2278x1134x 35 mm	2278x1134x 30 mm	2256x1133x 35 mm	2278x1134x 35 mm
Solar cells	kg/pcs	1.26	1.26	1.69	1.69	1.69	1.69	1.69
Aluminium Frame	kg/pcs	1.96	1.96	2.80	2.82	2.62	2.78	2.81
Glass	kg/pcs	14.98	14.98	25.32	25.56	19.98	19.80	19.98
Back sheet	kg/pcs	0.83	0.83	0.00	0.00	1.10	1.09	1.10
EVA	kg/pcs	1.80	1.80	1.17	1.18	2.40	2.37	2.40
POE	kg/pcs	0.00	0.00	1.18	1.19	0.00	0.00	0.00
Junction box	kg/pcs	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Silica gel	kg/pcs	0.29	0.29	0.34	0.33	0.37	0.35	0.40

Solder	kg/pcs	0.16	0.16	0.20	0.20	0.20	0.20	0.20
Flux	kg/pcs	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Wood board	kg/pcs	0.98	0.98	0.87	1.46	1.26	0.87	1.46
Corrugated Box	kg/pcs	0.10	0.10	0.17	0.12	0.10	0.17	0.06
Packaging film	kg/pcs	0.05	0.05	0.07	0.07	0.07	0.07	0.13

1.5. Declaration of Methodological Framework

In this project, a full LCA approach was considered with some simplification on data modeling using generic data for most background systems. The EPD analysis uses a cradle-to-grave system boundary. No known flows are deliberately excluded from this EPD.

To calculate the LCA results for the product maintenance stage, a 30-year reference service life (RSL) was assumed for the declared products.

Additional details on assumptions, cut-offs and allocation procedures can be found in section 2.3, 2.4, 2.8 respectively.

1.6. Technical Requirements

The chart below lists all standards required for Astronergy's PV modules.

Table 3 Technical standards of Astronergy's PV modules

PRODUCT	STANDARDS
CHSM72M-HC	IEC61215/IEC61730/IEC61701/IEC62716/IEC TS 62804 IEC 60068/IEC 62759/IEC TS 62782 /IEC TS 62941/UL 61730
CHSM72M(DG)/F-BH	
CHSM54M(BL)-HC	
CHSM54M-HC	

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The functional unit is the product category unit to be referred to when determining environmental impacts. In order to assess the environmental impacts of different products. It is important that the functional units of these products are equivalent so that the results may be interpreted clearly.

In this report, the functional unit is defined as 1 kWh of electricity generated as output from the solar photovoltaic plant.

2.2. System Boundary

The system boundary considered in this LCA study is from cradle to grave, except use by end consumer. Figure 2 below illustrates the system boundaries for the Astronergy's PV modules, including raw material production and transportation, manufacturing, delivery, solar plant installation and waste disposal.

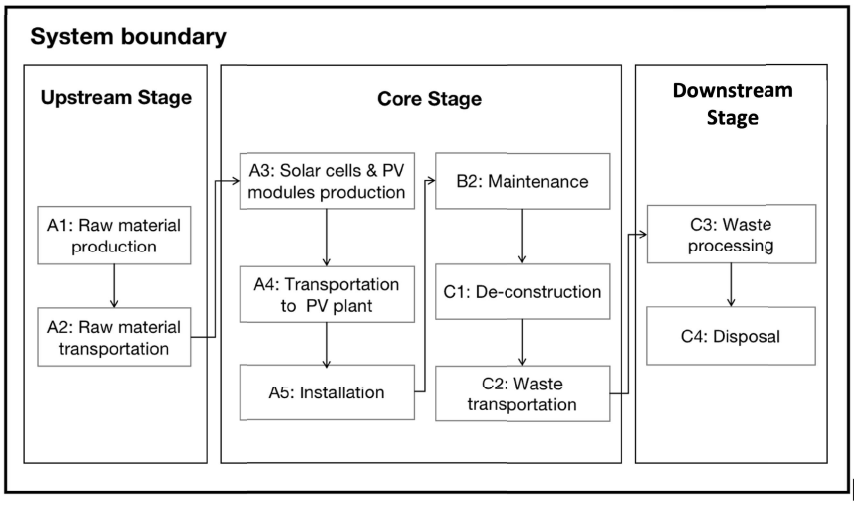

Figure 2 System boundaries

According to the PCR, the life cycle stage must refer to segmentation in the following three processes:

Upstream Stage: which include extraction and processing of raw materials, disposal of waste associated with the processes (A1) and transportation of the raw material to the factory (A2);

Core Stage: which include manufacturing of the solar cells and PV modules (A3) with the supply of the energy and auxiliary material inputs, and emissions, and distribution of PV modules to solar PV plant (A4); the construction of the solar plant (A5), the maintenance (B2) during the RSL (30 years) period; de-construction and demolition of the solar PV plant (C1); transport to waste processing (C2). However, considering the studied PV plant has not operated for 30 years, for simplification purposes, the assumption was made on the LCI data during the modeling of core processes;

Downstream Stage: which include waste processing (C3) and disposal (C4), and all the relevant processes that take place outside of the control of the organization proposing the EPD. According to the PCR, the benefit and avoided loads in module D are not declared in the present study as the reuse & recycling processes would take place 30 years later and the technology advancement is hard to predict. Besides, Astronergy cannot obtain the life cycle inventory of distribution station, therefore, the distribution loss of electricity to the customer, and operation and maintenance of the distribution systems will not be declared in this study.

2.3. Estimates and Assumptions

The key assumptions of this LCA study are as follows：

- For missing background data, the substitution of missing data using a similar background data approach was taken to shorten the gap;
- Life cycle inventory (LCI) data of silicon ingot and the silicon wafer is difficult to obtain at the stage, thus an average LCI data for China in IEA PVPS Task 12,2020 is used for modelling;
- The PV plant data inventory is from the real solar farm in Jinchang, Gansu Province with a capacity of 28.5 MW, which has been in operation for less than 30 years. Therefore, the electricity generation during RSL is modeled with real plant via PVSYST V6.86, by taking the most stable power output for each brand series as the representative;

- The electricity consumption during the deconstruction of PV plant (C1) is assumed same as the electricity consumption of construction stage (A5), and electricity consumption for PV module dismantling at waste processing stage (C3) is assumed same to the electricity consumption of PV module assembling;
- During the end-of-life stage, the transportation of the waste PV modules and other equipment from the solar PV plant to treatment facilities including recycling, landfill, or incineration center is assumed to be 200 km for simplification purposes.

2.4. Cut-off Criteria

The definition of cut-off criteria allows some data from the inventory to be disregarded when such data is considered irrelevant for the purposes of the study and would only represent an unnecessary burden in collecting data, without significantly altering the end result.

For this study, the cut-off rules are as follows:

- **Upstream -** production and disposal of intermediate product packaging
- **Core -** material and energy flows within the system controlled by the EPD holder, provided that their contribution does not exceed 2% (respectively, of the photovoltaic module's unit weight and the energy needed to produce and assemble it)
- **Core -** inspection operations in the case of plants which are easily accessible. This means plants, typically stand-alone but not exclusively, that are within 10km of control personnel.

Table 4 Cut off flows

Flow name	Process stage	Mass %	Reason to cut off
Inspection during operation of solar plant	B	N/A	Cut off due to small impact according to PCR

2.5. Reference Service life and Estimated Building Service Life

The reference service life of products is 30 years.

2.6. Data Sources

In this LCA study, specific data related to materials or energy flows within the production was calculated and submitted by Astronergy, generic data for certain processes were sourced from databases in SimaPro 9.2. SimaPro is the world's most widely used LCA software and the data in it comes predominantly from Ecoinvent 3.7, the world's most complete and widely used set of data on industrial processes, material production, packaging production, transport and so on.

2.7. Data Quality

Steps were taken to ensure that the life cycle inventory data were reliable and representative. The type of data that was used is clearly stated in the Inventory Analysis, be it measured or calculated from primary sources or whether data are from the life cycle inventory databases.

The data quality requirements for this study were as follows:

• Existing LCI data were, at most, 10 years old. Newly collected LCI data were current or up to 3 years old;

- The LCI data related to the geographical locations where the processes occurred;
- The technology represented the average technologies at the time of data collection.

2.8. Allocation

Allocation refers to partitioning of input or output flows of a process or a product system between the product systems under study and one or more other product systems. In this study, there are three types of allocation procedures considered:

Multi-input processes

For data sets in this study, the allocation of the inputs from coupled processes is generally carried out via the mass. The consumption of raw materials is allocated by mass ratio. The transportation of raw materials is allocated by mass ratio.

Multi-output processes

In the production of Solar Cells and PV modules, the total consumption of energy and water during manufacturing is equally allocated to per unit mass. No other by products are produced from the production, hence there is no production of by products that need to be used to allocate the situation.

Allocation for recovery processes

For the allocation of residuals, the model allocation cut-off by classification (ISO standard) (called “Allocation Recycled Content”, alloc rec, by Ecoinvent) is used. The underlying philosophy of this approach is that primary (first) production of materials is always allocated to the primary user of a material. If a material is recycled, the primary producer does not receive any credit for the provision of any recyclable materials. Consequently, recyclable materials are available burden-free for recycling processes, and secondary (recycled) materials bear only the impacts of the recycling processes.

During the end of life stage of the solar plant, the extra benefit of recycling the waste modules as well as other equipment is cut off from the boundary, following the PCR’s recommendation on end of life scenario. Along with the benefit, the load from waste treatment for recycling purpose such as de-pollution and crushing and etc, is also allocated to the next life cycle of substituted products, but not the primary producers of PV module, hence no burden or benefit will be allocated to the primary producer of the PV module or solar PV plant (cut off approach).

2.9. Period under Review

The study used primary data collected from November 2021 - April 2022.

2.10. Comparability and Benchmarking

No comparisons or benchmarking are included in this EPD. LCA results across EPDs can be calculated with different background databases, modeling assumptions, geographic scope and time periods, all of which are valid and acceptable according to the Product Category Rules (PCR) and ISO standards. The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading.

2.11. Units

SI units are used for all LCA results of Astronergy’s PV modules.

3. Life Cycle Assessment Scenarios

3.1. Manufacturing

The PV module products under study includes 7 models (see Table 1). All the products share similar manufacturing processes and life cycle stages. A flowchart depicting the production process stages of Astronergy's PV modules is shown in Figure 3 below. For simplification purpose, only main stages of manufacturing are presented, raw material, auxiliary processes considered in the LCA but not shown in the flowcharts, which include:

- Raw and auxiliary material production and transportation
- Recycling of waste materials;
- Waste water and off gas treatment;
- Water recycling and reuse system;
- Supply of natural gas/water/electricity

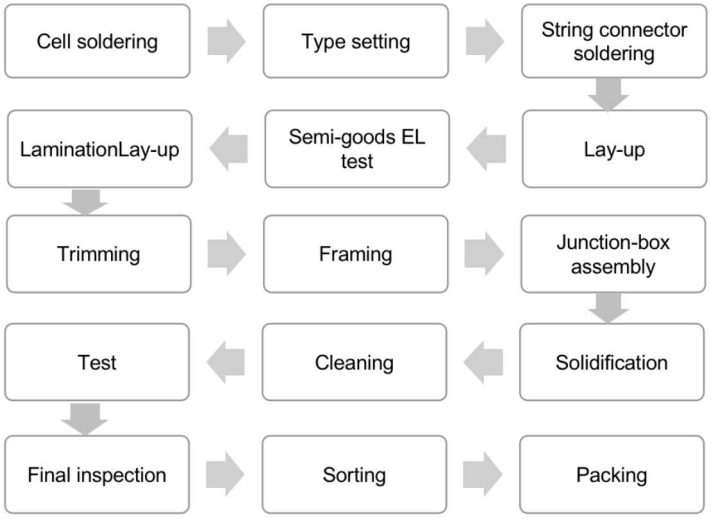

Figure 3 PV module production process

3.2. Packaging

There are three main kinds of packaging materials, corrugated box (paper), wood board (wood), packaging film (plastic).

3.3. Transportation

After the PV module is manufactured, the PV panels, along with other materials, such as brackets, cable, inverters are transported to the installation site(Jinchang, Gansu in China). In this study a default value for the distance is given in table 5.

Table 5 Transport to the installation site (A4)

NAME	VALUE	UNIT
Fuel type	Diesel	
Liters of fuel	31.11	l/100km
Vehicle type	Truck	
Transport distance	2100	km
Capacity utilization (including empty runs, mass based)	100	%
Gross density of products transported	N/A	kg/m^3
Volume of products transported (if gross density not reported)	N/A	m^3
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	=1	-

3.4. Production Installation

The specific data regarding solar PV plant installation was taken from a real PV plant in Jinchang (Gansu) in China, the PV plant has energy yield capacity 25 MW.The detailed information about the PV plant is listed in Table 6.

Table 6 PV plant information

PARAMETERS	VALUE		SOURCE
	AMOUNT	UNIT	
Peak power of the plant	25000	KW	Astronergy
Plant latitude and longitude	102.5°N,38.15°E	°	Astronergy
Plant altitude	1680	m	Astronergy
Nominal solar irradiance	1732000	Wh/m²/year	Astronergy

3.5. Disposal

For the end-of-life stage, De-construction (C1) of the PV plant during the disposal stage is assumed to mainly consuming electricity, and the electricity consumption is assumed the same as the construction stage (A5), 200km transportation distance from the plant site to waste treatment site (C2) is assumed, electricity used for PV module demolition during waste processing (C3) stage is assumed the same as PV module manufacturing stage (A3). For the end-of-life disposal treatment process (C4), the infrastructures of PV plants such as inverters are considered fully reused, most of the PV modules will be collected and recycled. However, the PV plant has just operated, there is a lack of existing data of recycling rate vs. disposal rate for PV module. At present, any regulations about PV recycle rate could hardly be found in China. Thus, this study refers to legal requirements issued by Waste Electrical and Electronic Equipment (WEEE) under the EU scenario. In 2012/19/EU-Article 11 & ANNEX V, the required recycling rate for waste PV module is 85%. Therefore, 15% of waste PV modules end up with waste disposal, mostly are waste glass, waste aluminum alloy and plastics. A waste management scenario of 20% recycling and 80% landfill was adopted for the waste disposal. A sensitivity analysis is further conducted to see the various disposal scenarios' impact on the results. Following the end-of-life load and benefit allocation approach, reuse, recovery, and/or recycling potentials (D) are not declared in this study.

4. Life Cycle Assessment Results

Table 7 Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type: cradle-to-grave	X	X	X	X	X	MND	X	MND	MND	MND	MND	MND	X	X	X	X	MND

4.1. Life Cycle Impact Assessment Results

This EPD follows the PCR EPDItaly014 – Photovoltaic modules guideline and use the recommended impact method for the analysis, the EN 15804+A2:2019 method was used in this report. The EN 15804 standard covers Environmental Product Declarations (EPDs) of construction products. The A2:2019 revision of this standard has aligned their methodology with the Environmental Footprint (EF) 3.0 method, except for their approach on biogenic carbon. According to the EN 15804, biogenic carbon emissions cause the same amount of Climate Change as fossil carbon, but can be neutralized by removing this carbon from the atmosphere again.

Based on the model of PV module products, the EN 15804 result is calculated and the tables below shows the results. Note that impact results are calculated based on 1 kWh electricity generated by the PV plant. The results have been demonstrated through different processes according to the PCR, namely upstream, core, and downstream processes.

Table 8 Life Cycle Impact Assessment Results- CHSM72M-HC (530W-560W 2256x1133x35）

IMPACT CATEGORY	UNIT	UPSTREAM		CORE STREAM						DOWNSTREAM		TOTAL
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.88E-03	6.87E-05	1.09E-03	3.94E-04	3.29E-03	1.44E-04	9.46E-06	5.94E-05	1.95E-04	3.63E-06	1.51E-02
Climate change - Fossil	kg CO2 eq	9.99E-03	6.88E-05	1.10E-03	3.94E-04	3.30E-03	1.46E-04	9.55E-06	5.95E-05	1.96E-04	3.69E-06	1.53E-02
Climate change - Biogenic	kg CO2 eq	-1.07E-04	-8.26E-08	-8.84E-06	-5.80E-07	-1.31E-05	-1.34E-06	-8.78E-08	-8.76E-08	-1.81E-06	-6.41E-08	-1.33E-04
Climate change - Land use and LU change	kg CO2 eq	4.33E-06	1.40E-08	1.55E-08	7.06E-08	4.17E-06	2.20E-09	2.03E-10	1.07E-08	2.96E-09	4.75E-10	8.62E-06
Ozone depletion	kg CFC-11 eq	6.12E-10	1.21E-11	1.49E-11	6.95E-11	4.90E-10	4.98E-13	4.41E-14	1.05E-11	6.65E-13	1.91E-13	1.21E-09
Acidification	molc H+ eq	6.82E-05	3.55E-07	5.86E-06	2.04E-06	3.97E-05	9.52E-07	6.31E-08	3.09E-07	1.28E-06	6.91E-09	1.19E-04
Eutrophication	kgPO4eq	2.33E-06	3.48E-09	1.33E-07	1.85E-08	6.02E-06	2.01E-08	1.46E-09	2.80E-09	2.72E-08	1.55E-10	8.56E-06
Photochemical ozone formation	kg NMVOC eq	3.45E-05	3.61E-07	2.58E-06	2.08E-06	1.68E-05	4.56E-07	3.00E-08	3.14E-07	6.15E-07	7.19E-09	5.77E-05
Mineral, materials resource depletion*	kg Sb eq	4.34E-06	4.16E-09	3.38E-09	2.50E-08	8.73E-07	6.75E-10	7.60E-11	3.77E-09	8.92E-10	4.75E-12	5.26E-06
Resource use, fossils*	MJ	1.07E-01	1.01E-03	1.01E-02	5.78E-03	3.65E-02	1.26E-03	8.30E-05	8.73E-04	1.70E-03	1.94E-05	1.64E-01
Water resource depletion	m3 water eq	1.37E-02	5.62E-06	4.20E-04	3.28E-05	1.20E-03	3.14E-05	2.92E-07	4.95E-06	5.72E-06	2.56E-07	1.54E-02

Table 9 Life Cycle Impact Assessment Results- CHSM72M-HC (540W-560W 2278x1134x35)

IMPACT CATEGORY	UNIT	UPSTREAM		CORE STREAM						DOWNSTREAM		TOTAL
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.80E-03	6.92E-05	1.08E-03	3.94E-04	3.29E-03	1.44E-04	9.46E-06	5.94E-05	1.93E-04	3.63E-06	1.50E-02
Climate change - Fossil	kg CO2 eq	9.95E-03	6.93E-05	1.09E-03	3.95E-04	3.30E-03	1.46E-04	9.55E-06	5.95E-05	1.95E-04	3.69E-06	1.52E-02
Climate change - Biogenic	kg CO2 eq	-1.53E-04	-8.35E-08	-8.76E-06	-5.81E-07	-1.31E-05	-1.34E-06	-8.78E-08	-8.76E-08	-1.80E-06	-6.43E-08	-1.79E-04
Climate change - Land use and LU change	kg CO2 eq	4.32E-06	1.41E-08	1.54E-08	7.07E-08	4.17E-06	2.20E-09	2.03E-10	1.07E-08	2.94E-09	4.76E-10	8.61E-06
Ozone depletion	kg CFC-11 eq	6.14E-10	1.22E-11	1.47E-11	6.96E-11	4.90E-10	4.98E-13	4.41E-14	1.05E-11	6.59E-13	1.91E-13	1.21E-09
Acidification	molc H+ eq	6.79E-05	3.57E-07	5.81E-06	2.05E-06	3.97E-05	9.52E-07	6.31E-08	3.09E-07	1.27E-06	6.92E-09	1.18E-04
Eutrophication	kgPO4eq	2.32E-06	3.50E-09	1.31E-07	1.85E-08	6.02E-06	2.01E-08	1.46E-09	2.80E-09	2.69E-08	1.55E-10	8.55E-06
Photochemical ozone formation	kg NMVOC eq	3.44E-05	3.63E-07	2.56E-06	2.08E-06	1.68E-05	4.56E-07	3.00E-08	3.14E-07	6.10E-07	7.19E-09	5.76E-05
Mineral, materials resource depletion*	kg Sb eq	4.33E-06	4.20E-09	3.35E-09	2.50E-08	8.73E-07	6.75E-10	7.60E-11	3.77E-09	8.84E-10	4.74E-12	5.24E-06
Resource use, fossils*	MJ	1.06E-01	1.01E-03	1.01E-02	5.79E-03	3.65E-02	1.26E-03	8.30E-05	8.73E-04	1.69E-03	1.94E-05	1.64E-01
Water resource depletion	m3 water eq	1.36E-02	5.66E-06	4.16E-04	3.29E-05	1.20E-03	3.14E-05	2.92E-07	4.95E-06	5.67E-06	2.56E-07	1.53E-02

Table 10 Life Cycle Impact Assessment Results- CHSM72M-HC (540W-560W 2278x1134x30)

Impact category	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.69E-03	6.84E-05	1.08E-03	3.88E-04	3.29E-03	1.44E-04	9.46E-06	5.94E-05	1.93E-04	3.61E-06	1.49E-02
Climate change - Fossil	kg CO2 eq	9.82E-03	6.84E-05	1.09E-03	3.89E-04	3.30E-03	1.46E-04	9.55E-06	5.95E-05	1.95E-04	3.67E-06	1.51E-02
Climate change - Biogenic	kg CO2 eq	-1.35E-04	-8.22E-08	-8.76E-06	-5.72E-07	-1.31E-05	-1.34E-06	-8.78E-08	-8.76E-08	-1.80E-06	-5.95E-08	-1.61E-04
Climate change - Land use and LU change	kg CO2 eq	4.07E-06	1.40E-08	1.54E-08	6.97E-08	4.17E-06	2.20E-09	2.03E-10	1.07E-08	2.94E-09	4.50E-10	8.36E-06
Ozone depletion	kg CFC-11 eq	5.98E-10	1.20E-11	1.47E-11	6.86E-11	4.90E-10	4.98E-13	4.41E-14	1.05E-11	6.59E-13	1.89E-13	1.20E-09
Acidification	molc H+ eq	6.71E-05	3.53E-07	5.81E-06	2.02E-06	3.97E-05	9.52E-07	6.31E-08	3.09E-07	1.27E-06	6.77E-09	1.18E-04
Eutrophication	kgPO4eq	2.29E-06	3.46E-09	1.31E-07	1.83E-08	6.02E-06	2.01E-08	1.46E-09	2.80E-09	2.69E-08	1.47E-10	8.51E-06
Photochemical ozone formation	kg NMVOC eq	3.39E-05	3.59E-07	2.56E-06	2.05E-06	1.68E-05	4.56E-07	3.00E-08	3.14E-07	6.10E-07	7.09E-09	5.71E-05
Mineral, materials resource depletion*	kg Sb eq	4.18E-06	4.14E-09	3.35E-09	2.46E-08	8.73E-07	6.75E-10	7.60E-11	3.77E-09	8.84E-10	4.87E-12	5.10E-06
Resource use, fossils*	MJ	1.05E-01	1.00E-03	1.01E-02	5.70E-03	3.65E-02	1.26E-03	8.30E-05	8.73E-04	1.69E-03	1.91E-05	1.62E-01
Water resource depletion	m3 water eq	1.35E-02	5.59E-06	4.16E-04	3.24E-05	1.20E-03	3.14E-05	2.92E-07	4.95E-06	5.67E-06	2.44E-07	1.52E-02

Table 11 Life Cycle Impact Assessment Results- CHSM72M(DG)/F-BH (535W-555W 2256x1133x35)

Impact category	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.32E-03	7.89E-05	1.01E-03	4.33E-04	3.03E-03	1.33E-04	8.72E-06	5.48E-05	1.81E-04	7.41E-07	1.43E-02
Climate change - Fossil	kg CO2 eq	9.41E-03	7.90E-05	1.02E-03	4.34E-04	3.04E-03	1.34E-04	8.80E-06	5.48E-05	1.83E-04	8.01E-07	1.44E-02
Climate change - Biogenic	kg CO2 eq	-9.76E-05	-9.89E-08	-8.22E-06	-6.38E-07	-1.21E-05	-1.24E-06	-8.09E-08	-8.07E-08	-1.69E-06	-5.98E-08	-1.22E-04
Climate change - Land use and LU change	kg CO2 eq	4.06E-06	1.57E-08	1.44E-08	7.77E-08	3.84E-06	2.03E-09	1.87E-10	9.83E-09	2.76E-09	4.40E-10	8.02E-06
Ozone depletion	kg CFC-11 eq	5.84E-10	1.39E-11	1.38E-11	7.65E-11	4.52E-10	4.59E-13	4.06E-14	9.67E-12	6.18E-13	2.07E-13	1.15E-09
Acidification	molc H+ eq	6.55E-05	4.08E-07	5.45E-06	2.25E-06	3.66E-05	8.77E-07	5.82E-08	2.84E-07	1.19E-06	6.67E-09	1.13E-04
Eutrophication	kgPO4eq	2.17E-06	3.94E-09	1.23E-07	2.04E-08	5.55E-06	1.85E-08	1.35E-09	2.58E-09	2.52E-08	1.41E-10	7.91E-06
Photochemical ozone formation	kg NMVOC eq	3.30E-05	4.15E-07	2.40E-06	2.29E-06	1.55E-05	4.20E-07	2.77E-08	2.89E-07	5.72E-07	6.90E-09	5.49E-05
Mineral, materials resource depletion*	kg Sb eq	4.05E-06	4.82E-09	3.14E-09	2.75E-08	8.05E-07	6.22E-10	7.00E-11	3.47E-09	8.29E-10	4.67E-12	4.90E-06
Resource use, fossils*	MJ	9.94E-02	1.16E-03	9.44E-03	6.36E-03	3.37E-02	1.16E-03	7.64E-05	8.04E-04	1.58E-03	2.03E-05	1.54E-01
Water resource depletion	m3 water eq	1.27E-02	6.48E-06	3.91E-04	3.61E-05	1.11E-03	2.90E-05	2.69E-07	4.56E-06	5.32E-06	2.12E-07	1.43E-02

Table 12 Life Cycle Impact Assessment Results- CHSM72M(DG)/F-BH (535W-555W 2278x1134x35)

Impact category	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.22E-03	7.92E-05	1.00E-03	4.30E-04	3.03E-03	1.33E-04	8.72E-06	5.48E-05	1.79E-04	7.41E-07	1.41E-02
Climate change - Fossil	kg CO2 eq	9.36E-03	7.93E-05	1.01E-03	4.30E-04	3.04E-03	1.34E-04	8.80E-06	5.48E-05	1.81E-04	8.00E-07	1.43E-02
Climate change - Biogenic	kg CO2 eq	-1.41E-04	-9.95E-08	-8.14E-06	-6.34E-07	-1.21E-05	-1.24E-06	-8.09E-08	-8.07E-08	-1.67E-06	-5.97E-08	-1.65E-04
Climate change - Land use and LU change	kg CO2 eq	4.05E-06	1.58E-08	1.43E-08	7.71E-08	3.84E-06	2.03E-09	1.87E-10	9.83E-09	2.73E-09	4.40E-10	8.02E-06
Ozone depletion	kg CFC-11 eq	5.80E-10	1.39E-11	1.37E-11	7.59E-11	4.52E-10	4.59E-13	4.06E-14	9.67E-12	6.12E-13	2.07E-13	1.15E-09
Acidification	molc H+ eq	6.52E-05	4.09E-07	5.40E-06	2.23E-06	3.66E-05	8.77E-07	5.82E-08	2.84E-07	1.18E-06	6.67E-09	1.12E-04
Eutrophication	kgPO4eq	2.15E-06	3.96E-09	1.22E-07	2.02E-08	5.55E-06	1.85E-08	1.35E-09	2.58E-09	2.50E-08	1.41E-10	7.89E-06
Photochemical ozone formation	kg NMVOC eq	3.28E-05	4.16E-07	2.38E-06	2.27E-06	1.55E-05	4.20E-07	2.77E-08	2.89E-07	5.67E-07	6.90E-09	5.47E-05
Mineral, materials resource depletion*	kg Sb eq	4.03E-06	4.84E-09	3.11E-09	2.73E-08	8.05E-07	6.22E-10	7.00E-11	3.47E-09	8.22E-10	4.67E-12	4.87E-06
Resource use, fossils*	MJ	9.89E-02	1.16E-03	9.35E-03	6.31E-03	3.37E-02	1.16E-03	7.64E-05	8.04E-04	1.57E-03	2.03E-05	1.53E-01
Water resource depletion	m3 water eq	1.26E-02	6.50E-06	3.87E-04	3.58E-05	1.11E-03	2.90E-05	2.69E-07	4.56E-06	5.27E-06	2.12E-07	1.41E-02

Table 13 Life Cycle Impact Assessment Results- CHSM54M(BL)-HC

Impact category	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.98E-03	7.09E-05	1.17E-03	4.17E-04	3.29E-03	1.44E-04	9.46E-06	5.94E-05	2.64E-04	3.71E-06	1.54E-02
Climate change - Fossil	kg CO2 eq	1.01E-02	7.10E-05	1.18E-03	4.17E-04	3.30E-03	1.46E-04	9.55E-06	5.95E-05	2.67E-04	3.77E-06	1.56E-02
Climate change - Biogenic	kg CO2 eq	-1.43E-04	-8.31E-08	-9.55E-06	-6.14E-07	-1.31E-05	-1.34E-06	-8.78E-08	-8.76E-08	-2.46E-06	-6.11E-08	-1.70E-04
Climate change - Land use and LU change	kg CO2 eq	4.20E-06	1.47E-08	1.69E-08	7.48E-08	4.17E-06	2.20E-09	2.03E-10	1.07E-08	4.02E-09	4.63E-10	8.50E-06
Ozone depletion	kg CFC-11 eq	6.18E-10	1.24E-11	1.61E-11	7.36E-11	4.90E-10	4.98E-13	4.41E-14	1.05E-11	9.03E-13	1.94E-13	1.22E-09
Acidification	molc H+ eq	6.92E-05	3.66E-07	6.33E-06	2.16E-06	3.97E-05	9.52E-07	6.31E-08	3.09E-07	1.74E-06	6.95E-09	1.21E-04
Eutrophication	kgPO4eq	2.38E-06	3.62E-09	1.43E-07	1.96E-08	6.02E-06	2.01E-08	1.46E-09	2.80E-09	3.69E-08	1.51E-10	8.63E-06
Photochemical ozone formation	kg NMVOC eq	3.49E-05	3.72E-07	2.80E-06	2.20E-06	1.68E-05	4.56E-07	3.00E-08	3.14E-07	8.36E-07	7.29E-09	5.88E-05
Mineral, materials resource depletion*	kg Sb eq	4.35E-06	4.28E-09	3.64E-09	2.64E-08	8.73E-07	6.75E-10	7.60E-11	3.77E-09	1.21E-09	5.01E-12	5.27E-06
Resource use, fossils*	MJ	1.08E-01	1.04E-03	1.10E-02	6.12E-03	3.65E-02	1.26E-03	8.30E-05	8.73E-04	2.31E-03	1.96E-05	1.67E-01
Water resource depletion	m3 water eq	1.39E-02	5.79E-06	4.39E-04	3.47E-05	1.20E-03	3.14E-05	2.92E-07	4.95E-06	7.77E-06	2.51E-07	1.57E-02

Table 14 Life Cycle Impact Assessment Results- CHSM54M-HC

Impact category	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
Climate change	kg CO2 eq	9.85E-03	7.00E-05	1.16E-03	4.11E-04	3.29E-03	1.44E-04	9.46E-06	5.94E-05	2.61E-04	3.66E-06	1.53E-02
Climate change - Fossil	kg CO2 eq	9.99E-03	7.01E-05	1.17E-03	4.12E-04	3.30E-03	1.45E-04	9.54E-06	5.95E-05	2.63E-04	3.72E-06	1.54E-02
Climate change - Biogenic	kg CO2 eq	-1.41E-04	-8.21E-08	-9.43E-06	-6.06E-07	-1.31E-05	-1.34E-06	-8.77E-08	-8.76E-08	-2.43E-06	-6.03E-08	-1.68E-04
Climate change - Land use and LU change	kg CO2 eq	4.15E-06	1.45E-08	1.66E-08	7.38E-08	4.17E-06	2.20E-09	2.03E-10	1.07E-08	3.97E-09	4.57E-10	8.44E-06
Ozone depletion	kg CFC-11 eq	6.10E-10	1.23E-11	1.59E-11	7.27E-11	4.90E-10	4.98E-13	4.40E-14	1.05E-11	8.91E-13	1.92E-13	1.21E-09
Acidification	molc H+ eq	6.83E-05	3.61E-07	6.25E-06	2.14E-06	3.97E-05	9.51E-07	6.31E-08	3.08E-07	1.72E-06	6.86E-09	1.20E-04
Eutrophication	kgPO4eq	2.35E-06	3.57E-09	1.42E-07	1.94E-08	6.02E-06	2.01E-08	1.46E-09	2.80E-09	3.64E-08	1.49E-10	8.59E-06
Photochemical ozone formation	kg NMVOC eq	3.45E-05	3.67E-07	2.76E-06	2.17E-06	1.68E-05	4.55E-07	3.00E-08	3.14E-07	8.25E-07	7.19E-09	5.82E-05
Mineral, materials resource depletion*	kg Sb eq	4.30E-06	4.22E-09	3.59E-09	2.61E-08	8.73E-07	6.75E-10	7.59E-11	3.77E-09	1.20E-09	4.94E-12	5.21E-06
Resource use, fossils*	MJ	1.07E-01	1.03E-03	1.08E-02	6.04E-03	3.65E-02	1.26E-03	8.29E-05	8.72E-04	2.29E-03	1.93E-05	1.66E-01
Water resource depletion	m3 water eq	1.38E-02	5.71E-06	4.33E-04	3.43E-05	1.20E-03	3.14E-05	2.92E-07	4.95E-06	7.67E-06	2.47E-07	1.55E-02

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

4.2. Life Cycle Inventory Results

To analysis the contribution of life stage to the environmental impact, an LCIA was conducted using EN 15804 method. The result was allocated by stages, as shown in tables below.

Table 15 Resource Use- CHSM72M-HC (530W-560W 2256x1133x35）

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.39E-01	1.01E-03	1.42E-02	5.77E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.83E-03	1.94E-05	2.07E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.58E-02	1.27E-05	6.86E-04	7.15E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.85E-04	6.51E-07	3.04E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	6.41E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.41E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	2.03E-01	1.01E-03	1.42E-02	5.77E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.83E-03	1.94E-05	2.71E-01
PERT:Total use of renewable primary energy resources	MJ	2.58E-02	1.27E-05	6.86E-04	7.15E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.85E-04	6.51E-07	3.04E-02
FW:Use of net fresh water	m3	3.23E-04	1.36E-07	9.78E-06	7.77E-07	2.95E-05	7.34E-07	6.94E-09	1.17E-07	1.36E-07	2.17E-08	3.64E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 16 Output Flows and Waste Categories- CHSM72M-HC (530W-560W 2256x1133x35）

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.56E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.56E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 17 Resource Use- CHSM72M-HC (540W-560W 2278x1134x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.39E-01	1.01E-03	1.41E-02	5.78E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.80E-03	1.94E-05	2.06E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.61E-02	1.28E-05	6.80E-04	7.16E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.82E-04	6.51E-07	3.08E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	6.46E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	2.03E-01	1.01E-03	1.41E-02	5.78E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.80E-03	1.94E-05	2.71E-01
PERT:Total use of renewable primary energy resources	MJ	2.61E-02	1.28E-05	6.80E-04	7.16E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.82E-04	6.51E-07	3.08E-02
FW:Use of net fresh water	m3	3.20E-04	1.37E-07	9.69E-06	7.78E-07	2.95E-05	7.34E-07	6.94E-09	1.17E-07	1.35E-07	2.17E-08	3.62E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 18 Output Flows and Waste Categories- CHSM72M-HC (540W-560W 2278x1134x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 19 Resource Use- CHSM72M-HC (540W-560W 2278x1134x30)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.37E-01	1.00E-03	1.41E-02	5.69E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.80E-03	1.90E-05	2.04E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.58E-02	1.26E-05	6.80E-04	7.05E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.82E-04	6.26E-07	3.04E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	6.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.40E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	2.01E-01	1.00E-03	1.41E-02	5.69E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	2.80E-03	1.90E-05	2.68E-01
PERT:Total use of renewable primary energy resources	MJ	2.58E-02	1.26E-05	6.80E-04	7.05E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	2.82E-04	6.26E-07	3.04E-02
FW:Use of net fresh water	m3	3.20E-04	1.35E-07	9.69E-06	7.66E-07	2.95E-05	7.34E-07	6.94E-09	1.17E-07	1.35E-07	2.13E-08	3.61E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 20 Output Flows and Waste Categories- CHSM72M-HC (540W-560W 2278x1134x30)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 21 Resource Use- CHSM72M(DG)/F-BH (535W-555W 2256x1133x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.29E-01	1.16E-03	1.32E-02	6.35E-03	3.74E-02	1.93E-03	1.26E-04	8.03E-04	2.63E-03	2.01E-05	1.93E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.40E-02	1.45E-05	6.38E-04	7.87E-05	3.09E-03	1.94E-04	1.28E-05	9.95E-06	2.65E-04	6.50E-07	2.83E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	5.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.91E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	1.88E-01	1.16E-03	1.32E-02	6.35E-03	3.74E-02	1.93E-03	1.26E-04	8.03E-04	2.63E-03	2.01E-05	2.52E-01
PERT:Total use of renewable primary energy resources	MJ	2.40E-02	1.45E-05	6.38E-04	7.87E-05	3.09E-03	1.94E-04	1.28E-05	9.95E-06	2.65E-04	6.50E-07	2.83E-02
FW:Use of net fresh water	m3	3.00E-04	1.56E-07	9.09E-06	8.55E-07	2.72E-05	6.76E-07	6.39E-09	1.08E-07	1.27E-07	2.33E-08	3.38E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 22 Output Flows and Waste Categories- CHSM72M(DG)/F-BH (535W-555W 2256x1133x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.38E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.38E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 23 Resource Use- CHSM72M(DG)/F-BH (535W-555W 2278x1134x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.29E-01	1.16E-03	1.31E-02	6.30E-03	3.74E-02	1.93E-03	1.26E-04	8.03E-04	2.60E-03	2.01E-05	1.92E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.43E-02	1.46E-05	6.32E-04	7.81E-05	3.09E-03	1.94E-04	1.28E-05	9.95E-06	2.62E-04	6.50E-07	2.86E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	5.94E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.94E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	1.88E-01	1.16E-03	1.31E-02	6.30E-03	3.74E-02	1.93E-03	1.26E-04	8.03E-04	2.60E-03	2.01E-05	2.51E-01
PERT:Total use of renewable primary energy resources	MJ	2.43E-02	1.46E-05	6.32E-04	7.81E-05	3.09E-03	1.94E-04	1.28E-05	9.95E-06	2.62E-04	6.50E-07	2.86E-02
FW:Use of net fresh water	m3	2.97E-04	1.56E-07	9.01E-06	8.48E-07	2.72E-05	6.76E-07	6.39E-09	1.08E-07	1.25E-07	2.33E-08	3.35E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 24 Output Flows and Waste Categories- CHSM72M(DG)/F-BH (535W-555W 2278x1134x35)

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.36E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 25 Resource Use- CHSM54M(BL)-HC

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.41E-01	1.04E-03	1.54E-02	6.11E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	3.84E-03	1.95E-05	2.11E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.66E-02	1.31E-05	7.41E-04	7.57E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	3.86E-04	6.43E-07	3.14E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	6.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.42E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	2.05E-01	1.04E-03	1.54E-02	6.11E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	3.84E-03	1.95E-05	2.75E-01
PERT:Total use of renewable primary energy resources	MJ	2.66E-02	1.31E-05	7.41E-04	7.57E-05	3.36E-03	2.11E-04	1.39E-05	1.08E-05	3.86E-04	6.43E-07	3.14E-02
FW:Use of net fresh water	m3	3.29E-04	1.40E-07	1.02E-05	8.22E-07	2.95E-05	7.34E-07	6.94E-09	1.17E-07	1.85E-07	2.19E-08	3.71E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 26 Output Flows and Waste Categories- CHSM54M(BL)-HC

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.61E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.61E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 27 Resource Use- CHSM54M-HC

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
PENRE:Non-renewable primary resources used as an energy carrier (fuel)	MJ	1.39E-01	1.02E-03	1.52E-02	6.03E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	3.79E-03	1.93E-05	2.09E-01
PERE:Renewable primary energy used as energy carrier (fuel)	MJ	2.62E-02	1.30E-05	7.32E-04	7.47E-05	3.36E-03	2.11E-04	1.38E-05	1.08E-05	3.82E-04	6.35E-07	3.10E-02
PENRM:Non-renewable primary resources with energy content used as material	MJ	6.34E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.34E-02
PERM:Renewable primary resources with energy content used as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT:Total use of non-renewable primary energy resources	MJ	2.02E-01	1.02E-03	1.52E-02	6.03E-03	4.06E-02	2.09E-03	1.37E-04	8.71E-04	3.79E-03	1.93E-05	2.72E-01
PERT:Total use of renewable primary energy resources	MJ	2.62E-02	1.30E-05	7.32E-04	7.47E-05	3.36E-03	2.11E-04	1.38E-05	1.08E-05	3.82E-04	6.35E-07	3.10E-02
FW:Use of net fresh water	m3	3.25E-04	1.38E-07	1.01E-05	8.12E-07	2.95E-05	7.34E-07	6.93E-09	1.17E-07	1.82E-07	2.16E-08	3.67E-04
SM: Use of secondary raw materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF:Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF:Use of none renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 28 Output Flows and Waste Categories- CHSM54M-HC

Parameter	Unit	Upstream		Core stream						Downstream		Total
		A1	A2	A3	A4	A5	B2	C1	C2	C3	C4	
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	2.58E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.58E-05
NHWD:Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RWD:Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MRF:Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CRU:Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE: Exported thermal energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE: Exported electricity energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD:Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

4.3. Information on biogenic carbon content

Biogenic carbon content in product and packaging (there is no packaging) is below 5% and therefore omitted.

5. LCA Interpretation

The contribution analysis of the PV module products on various impact categories reveals that PV module including raw components production stage and PV plant construction stage are the main contributions to environmental impact categories. In terms of raw material stage, solar cells contribute the main environmental impact, followed by frame and glass. And for the PV plant construction stage, cable, bracket and inverter are the main sources of environmental impacts for the installation stage.

6. References

BS EN 50693:2019, Product category rules for life cycle assessments of electronic and electrical products and systems

EN 15804:2012+A2:2019, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

ISO 14025 - ISO14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures

PCR EPDItaly007: Electronic and Electrical Products and Systems.

PCR EPDItaly014: Electricity Produced by Photovoltaic Modules.

Report - LCA Report for Astronergy photovoltaic modules

T/CESA 1074—2020 T/CPIA 0021—2020 Technical specification for green-design product assessment - photovoltaic silicon wafer