LCA Report

Model : 24BK55YT

LG Electronics

1 General Information

Date of the report	5th July, 2023
The name of the persons/agents who drew up the report	Sangjin Jeong, LG Electronics Heeil Park, Ecoplus E&C
Identification of the LCA report	LLGE-24BK55YT-TUV-LCA-01
Period of validity	5 years
Period of data collection	2022.5 ~ 2023. 4 (1 years)
Location for the product manufacturing factory	LG Electronics Nanjing New Technology Co., Ltd. No.346 Yaoxin Road, Economic & Technical Zone, Nanjing China

2 PCR reference

This report was prepared by referring to the PCR of PEP, a European and French certification, as there is no separate monitor certification standard.

3 Reference flow and functional unit

The functional unit of the reference product (24BK55YT) is defined as " To view visual information through an electronic display screen according to the appropriate usage scenario defined in the Korea Product Usage Scenarios Guideline of Monitor, EPD 002:2013(00):201309 and during the 4-year lifetime of the product" according to PCR-ed4-EN-2021 09 06, PEP.

*** Reference flow and functional unit**

Model	24BK55YT		
Technology	LCD		
Function	View visual information through electronic display screen		
Product category (reference to the applicable PSR)	Monitor		
The description and justification of the functional unit (e.g. standards fulfilled by the reference product, test reports)	To view visual information through an electronic display screen according to the appropriate usage scenario defined in the Korea Product Usage Scenarios Guideline of Monitor, EPD 002:2013(00):201309 and during the 4-year lifetime of the product		
The description and justification of the declared unit	Ensure the view of visual information in the 000.0 cm(inch) screen area over a reference service life of 4 years as 0 hours of on-mode and 0 hours of standby mode		
Application Scope	The target market for reference products is across Europe. The goal of this declaration is to inform the results of a Life Cycle Assessment of the reference product and to compare or review the life cycle assessment results of other products produced by referring to the same PCR. This TUV is primarily intended for business-to-business communication.		
On-mode power	16.9 w	**Reference Life Time**	4 years
Sleep-mode power	0.5 w		
Stand by power	0.3 w		

*** Principal Components of the reference flow**

Product	A LCD Module, A(or multiple) Speaker(s), A Back Cover, A Cabinet, electronic components

Package	Box, Pulp Mold, Manuals
Installation elements	A Stand, A(or multiple) Cable(s)

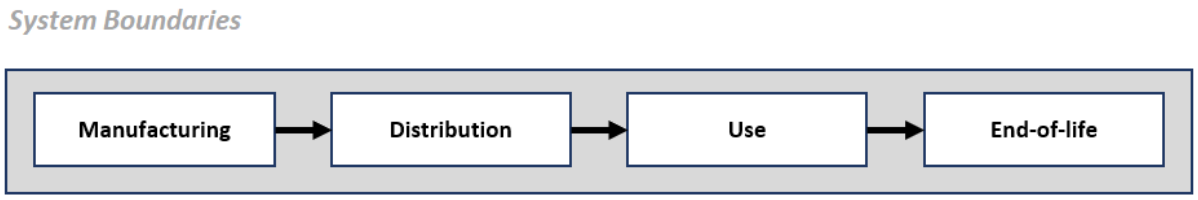
*** Mass of the representative product**

Total mass (packaging and additional elements included)	9.28321 kg
Total mass excluding packaging in manufacturing stage (only reference product)	6.18781 kg
Total mass of packaging	3.09540 kg

4 Life cycle inventory

The system boundary is defined below, which is based on PCR-ed4-EN-2015 04 02. The life cycle stage contains the stages of Manufacturing, Distribution, Installation, Use, and End-of-Life. Input and output are considered in each stage. In accordance with PCR ed4, net benefits and loads beyond the system boundary (Module D) is also included. The description of each stage can be found in section 3.3.1~3.3.5.

*** The system boundary**



4.1 Cut off criteria

Impacts on all of the components were included in this study without cut-off. The list of components is in Appendix 1.

4.2 Data sources

4.2.1 Data collection

This study is mainly analyzed by field data, collected through on-site visits to manufacturing factories and questionnaires from suppliers. The data qualities and sources of the environmental load used in this study are described below:

*** Data quality and sources used in this study**

Category	Sub-category	Data quality	Data source
Manufacturing (Extraction of raw materials)	Steel, Aluminum, ABS, POM, Glass, PET, PMMA etc.	Secondary	Ecoinvent v3.7.1, Korea national LCI DB
Manufacturing (Production)	Product (24BK55YT)	Primary	LG Electronics, Korea
Installation	Installation elements	Primary	LG Electronics, Korea
Distribution	Transportation	Primary	LG Electronics, Korea
Use	Total energy consumption	Primary	LG Electronics, Korea

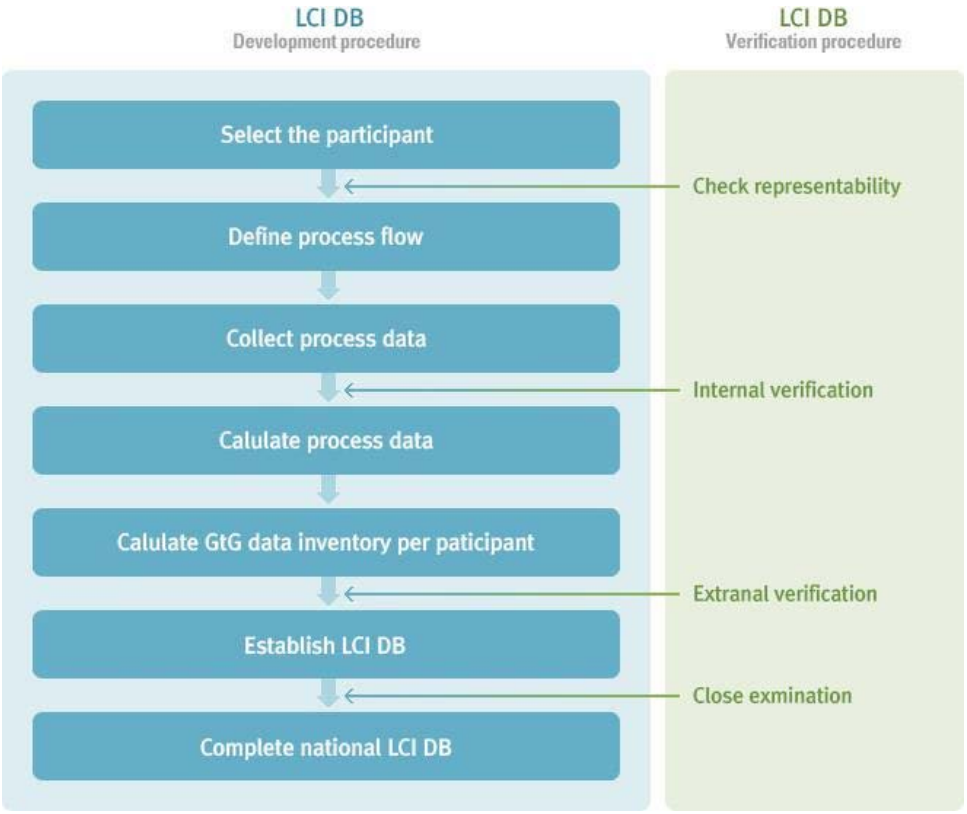
	Reference lifetime	Secondary	EPD 002:2013(00):201309, Korea
	Coefficient of use stage (P_h, P_c, SCOP, SEER, etc.)	Primary	LG Electronics, Korea
End-of-Life	Product disposal	-	EPD 002:2013(00):201309, Korea

The primary data provided by LG Electronics are applied to calculate the environmental impacts of the stage of product manufacturing, distribution, installation, use, end-of-life. Meanwhile, secondary data are applied to calculate the environmental impacts associated with raw materials extraction.

3.2.2 Secondary data requirements

Secondary data used in this study is divided into two types; Ecoinvent v3.7.1 DB, Korean LCI DB. All of the databases are belonged to the source; "4. LCI datasets based on LCA studies compliant with ISO 14040 and 14044 standards or any other reference document referring to these standards and independently verified." in section 2.9.2 'secondary data requirements', PCR-ed4-EN-2021 09 06. Especially, in the case of an unfamiliar Korean LCI DB, it is developed in accordance with ISO 14044. So Korean LCI DB used in this case has been verified by 3rd party verifiers. Development procedure of Korean LCI DB is described below.

* **Development procedure of Korean LCI DB** (http://epd.or.kr/eng/lci/lciIntro02.do)



3.2.3 Data quality assessment

Data quality of processes in life cycle stage were evaluated. Data quality criteria is made up with three items; TiR is Time-Representativeness, GR is the Geographical-Representativeness, and TeR is the Technological-Representativeness. After scoring 1 to 5 points for each category, I averaged it. Data quality assessment was conducted in accordance with the pedigree matrix below from Chapter 7.19.2.2 of the Product Environmental Footprint Guide, version 6.3, May 2018. When the data is not available, by default the DQR is equal to 5.

*** Pedigree matrix for data quality assessment**

	Excellent (1)	Very Good (2)	Good (3)	Fair (4)	Poor (5)
Time (TiR)	The report publication date happens within the time validity of the dataset	The report publication date happens not later than 2 years beyond the time validity of the dataset	The report publication date happens not later than 4 years beyond the time validity of the dataset	The report publication date happens not later than 6 years beyond the time validity of the dataset	The report publication date happens later than 6 years after the time validity of the dataset
Technological (TeR)	The technology used in the study is exactly the same as the one in scope of the dataset	The technologies used in the study is included in the mix of technologies in scope of the dataset	The technologies used in the study are only partly included in the scope of the dataset	The technologies used in the study are similar to those included in the scope of the dataset	The technologies used in the study are different from those included in the scope of the dataset
Geographical (GeR)	The process modelled in the study takes place in the country the dataset is valid for	The process modelled in the study takes place in the geographical region (e.g. Europe) the dataset is valid for	The process modelled in the study takes place in one of the geographical regions the dataset is valid for	The process modelled in the study takes place in a country that is not included in the geographical region(s) the dataset is valid for, but sufficient similarities are estimated based on expert judgement.	The process modelled in the study takes place in a different country than the one the dataset is valid for

Please refer to the appendix with regard to the secondary data quality.

3.2.4 Data coverage

The dataset used in study is indicated in Appendix 3. Used datasets.

4.3 Life cycle stages

4.3.1 Manufacturing stage

The manufacturing stage divides into two sub-processes, which are the extraction of raw materials and production. The monitor manufacturing process (Transformation, manufacturing, assembly) of LG Electronics includes the product packaging process.

There are many parts and suppliers of electronic products. Also, LGE has multiple suppliers of each component.

As all suppliers are located on Asia, it is assumed that the distance is 3,500 km from each supplier to LGE manufacturing plant in accordance with the transport scenario of PCR-ed4-EN 2021 09 06. Used dataset for transportation is 'transport, freight, lorry 16-32 metric ton, EUR05, Ecoinvent v3.7.1', which the geography is Rest of World.

There is the continuously process from the assembly process to the packaging process. There is no data to know the quantity of waste during the manufacturing stage. Therefore, in this study, to assess the impacts on waste during the manufacturing stage, we calculate the waste by the scenario described in EPD 002:2013(00):201309.

Used datasets about the waste during manufacturing are below.

[24BK55YT]

Category	Treatment	Mass[kg]	Used dataset		Source
			Dataset name	Geography	
Non-hazardous waste	Incineration	1.39E+00	treatment of municipal solid waste, incineration, CA-QC	CA-QC	Ecoinvent v3.7.1
	Landfill	1.39E+00	treatment of municipal solid waste, sanitary landfill, CA-QC	CA-QC	Ecoinvent v3.7.1
Hazardous waste	Incineration	2.78E+00	treatment of hazardous waste, hazardous waste incineration, RoW	Rest of World	Ecoinvent v3.7.1
Total		**2.18E+01**			

■Extraction of raw materials

The data of extraction of raw materials are listed in Appendix 4. Manufacturing stage – components

■ Packaging of raw materials

In this study, impact on production, transport, and disposal of the packaging of raw materials are included. Packaging of raw materials in the reference product system consist of Pulp mold, LDPE vinyl, Box, Wooden Pallet. The amount of packaging was calculated by using the total amount of disposed materials generated from the packaging of raw materials.

There is a limitation that the amount of the packaging of raw materials is not managed. To calculate the quantity of used packaging of raw materials, it was assumed as follows.

- waste associated with packaging of raw materials is equivalent with the amount of the packaging of raw materials,
- the amount of waste generated by all products manufactured in LGE is the same.

Therefore, the quantity of the packaging of raw materials was calculated as below.

$$Waste\ associated\ with\ packaging\ of\ raw\ material\ \times \frac{The\ reference\ product\ production\ amount}{Total\ product\ production\ amount}$$

Also, it is assumed that the distance is 3500 km in accordance with the transport scenario of PCR. Used dataset for transportation Is 'transport, freight, lorry 16-32 metric ton, EURO5, Ecoinvent v3.7.1', which the geography is Rest of World.

Details of the packaging of raw materials are as follow.

Category	Item	unit	Qty	Dataset	Geography
Packaging of Raw materials	Box	kg	1.15.E+00	containerboard production, linerboard, kraftliner, RoW	Rest of World
	Molded Pulp Packings	kg	1.80.E+00	containerboard production, linerboard, kraftliner, RoW	Rest of World
	Monitor packing (EPS)	kg	2.28.E-02	polystyrene production, expandable, RoW	Rest of World
	Accessaries Packing (vinyl bag)	kg	3.12.E-02	Polyethylene, low density, granulate production, RoW	Rest of World
	Manuals(paper)	kg	9.14.E-02	offset printing, per kg printed paper, RoW	Rest of World
Transport	Distance for each component	km	3500	-	-
	Mass of components	kg	3.10E+00	-	-
	Quantity of transport during manufacturing stage	ton*km	1.08E+01	transport, freight, lorry 16-32 metric ton, EURO 05, RoW	Rest of World

■Manufacturing factory

The reference product and homogenous products are produced in factories in Korea, China (Tianjin) and Turkey. Therefore, in data for manufacturing stage, data of each plant in Korea, China (Tianjin), and Turkey were collected, and the Korean plant, which had the largest impact, was applied as the "worst case". However, for the LCI DB, ecoinvent 3.7.1 was applied, not the Korean database.

■Electricity consumption

LG Electronics manage electricity consumption based on the facility for monitor production. There are many production lines for the monitors in the facility, also many monitors are produced in a production line. To calculate the electricity consumption for the production of the reference product, we allocate the electricity consumption from the total electricity consumption of the facility. The type of the electricity dataset used during the manufacturing stage is the Korean electricity mix.

First, this study calculates the electricity consumption of the production line from the total electricity consumption of the facility, considered the power capacity (KW) and the production time of production lines as below:

The electricity consumption of the production line =

$$\frac{The\ total\ electricity\ consumption\ of\ the\ facility\ x\ (the\ power\ capacity\ of\ a\ production\ liner)\ x\ the\ production\ time\ of\ production\ liner}{\sum_{i=1}^{n}\ (the\ power\ capacity\ of\ production\ linei\ x\ the\ production\ time\ of\ production\ linei)}$$

r = reference product, i = a production line

After, we calculate the electricity consumption of the electricity consumption for the reference product production considering the production amount of each monitor in the line as below:

The electricity consumption of the reference product production =

$$(The\ electricity\ consumption\ of\ the\ production\ liner\ )\ x\ (\frac{The\ reference\ product\ production\ amount}{Total\ product\ production\ amount\ of\ the\ production\ liner})$$

■Distribution for manufacturing stage

Distribution from the manufacturing stage to the final logistic platform is included in the manufacturing stage. A diagram of the distribution for manufacturing stage is shown below.

In each section transport distance and the used dataset is like below.

1) Manufacturer > Shanghai International Port(CN) : 311 km, transport, freight, lorry 16-32 metric ton, EURO5, Ecoinvent v3.7.1
2) Shanghai International Port(CN) > Haven van Rotterdam(NL) : 14823.2 km, transport, freight, sea, container ship, Ecoinvent v3.7.1
3) Amsterdam. Le port > European sales outlets : 970.9km, transport, freight, lorry 16-32 metric ton, EURO5, Ecoinvent v3.7.1

4.3.2 Distribution stage

The distribution stage includes: Transportation of the product in its packaging from the manufacturer's last logistics platform to the distributor and from the distributor to the installation place. A diagram of the distribution stage is shown below.

In each section transport distance and the used dataset is like below.

1) European sales outlets were calculated by weighted average of sales ratios in each country and distances in major cities.
2) The distances to major cities in each country were applied as the shortest distances.

Saled corporation	Applying country (Selling country)	Main city	Distance(km)	Saled rate	Weighted average distance (km)
LGEBN	Benelux	Bruxelles(Belgium)	175	5%	9

LGEDG	Germany	Berlin	724	42%	304
LGEFS	France	Pariy	475	9%	43
LGEHS	Greece	Athens	2,892	1%	29
LGEIS	Italy	Milano	1,063	9%	96
LGEMK	Hungary	Budapest	1,428	1%	14
LGEPL	Poland	Warszawa	1,262	1%	13
LGEPT	Portugal	Lisboa	2,201	1%	22
LGESW	Spain	Madrid	1,744	23%	401
LGEUK	United Kingdom	London	452	9%	41

4.3.3 Use stage

In the use stage, this study includes the energy consumption for the utilization process during the reference lifetime (4 years) and the consideration of refrigerant.

3.3.3.1 Energy consumption

The total energy consumption for output visual information during the use stage is mainly based on EPD 002:2013(00):201309. Therefore, in this study, the total energy consumption during the use stage was calculated by using the Electric Energy consumption. For this, used the formular and coefficients is as follow.

$$TE_c = \{(OFF_{E_c} \times A_1) + (SLP_{E_c} \times A_2) + (ON_{E_c} \times A_3)\} \times D \times Y \times D_t \times 10^{-3}$$

OFF_Ec(W)	16.90	**A1**	55%
SLP_Ec(W)	0.50	**A2**	5%
ON_Ec(W)	0.50	**A3**	40%
Reference Life Time(Dt)	4	**Tec(kWh)**	333.58

The type of the electricity dataset used during use stage is RER electricity mix grid, low voltage, and used dataset is ‘Electricity, low voltage, RER.

4.3.4 End-of-Life stage

4.3.4.1 Treatment of the bare product

In the End-of-Life stage, this study considers the transportation process of the waste and the treatment such as material recycling, recovery for energy production, incineration, landfill. In this stage of this study, it is assumed as follows.

- transportation to collect the end-of-life product and convey it from the location of use to its final treatment site is calculated under the assumption that 100km distance is transported by truck in accordance with the transport scenario of PSR-0013-ed2.0-EN-2019 12 06. Used dataset for transportation is 'transport, freight, lorry 7.5-16 metric ton, EURO5, Ecoinvent v3.7.1', which the geography is Europe (RER).
- as there is no evidence of recovery, the case 3 ratio from PSR-0013-ed2.0-EN-2019 12 06 is used when calculating the amount of the bare product to be treated,
- incinerated mass (with energy recovery) is the same with incinerated (without recovery), penalizing scenario,
- for plastic components that has no suitable dataset for recycling process, 'polyethylene terephthalate, granulate, amorphous, recycled, Europe without Switzerland, Ecoinvent v3.7.1' is used (penalizing scenario),
- PWBs are treated as like plastic family in accordance with PEP-PCR-ed4-EN-2021 09 06, so that used dataset for PWBs recovery/incineration/bury is same as plastics,

Used datasets for modelling each treatment are below. Among the used datasets, 'Recycled' includes the shredding and/or sorting stage. For PWBs, we present datasets for each of the shredding and sorting and recycling processes.

Treatment	Item	Dataset	Geography	Source
Recycled	PET	polyethylene terephthalate production, granulate, amorphous, recycled	GLO	Ecoinvent v3.7.1
	Other plastics	polyethylene terephthalate production, granulate, amorphous, recycled	Europe without Switzerland	Ecoinvent v3.7.1
	Metal	treatment of metal scrap, mixed, for recycling, unsorted, sorting	Europe without Switzerland	Ecoinvent v3.7.1
	Aluminium	treatment of aluminium scrap, post-consumer, prepared for recycling	RER	Ecoinvent v3.7.1
	PWB	treatment of scrap printed wiring boards, shredding and separation, RoW	RoW	Ecoinvent v3.7.1
	Others (paper)	graphic paper production, 100% recycled, RER	Europe	Ecoinvent v3.7.1
	Others (others)	treatment of waste polyethylene terephthalate, for recycling, unsorted, sorting, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Recovered / Incinerated	Plastics	Treatment of waste plastic, mixture, municipal incineration	RoW	Ecoinvent v3.7.1
	Steel	treatment of scrap steel, municipal incineration	Europe without Switzerland	Ecoinvent v3.7.1
	Aluminium	treatment of scrap aluminium, municipal incineration	Europe without Switzerland	Ecoinvent v3.7.1
	PWB	treatment of waste plastic, mixture, municipal incineration	RoW	Ecoinvent v3.7.1
	others	treatment of municipal solid waste, incineration	CA-QC	Ecoinvent v3.7.1
Buried	Plastics	Treatment of waste plastic, mixture, sanitary landfill	RoW	Ecoinvent v3.7.1
	Steel	treatment of scrap steel, inert material landfill, sorting	Europe without Switzerland	Ecoinvent v3.7.1

	Aluminium	treatment of waste aluminium, sanitary landfill	RoW	Ecoinvent v3.7.1
	PWB	treatment of waste plastic, mixture, sanitary landfill	RoW	Ecoinvent v3.7.1
	others	treatment of municipal solid waste, sanitary landfill	CA-QC	Ecoinvent v3.7.1

5 List of elementary flows

Elementary flows are attached. Please check the file named 'Data sheet_24BK55YT.xls'.

5.1 LCA Software info.

LCA S/W name	- Simapro
LCA S/W version	- 9.4.0.2
Copyright	- PRé Sustainability

6 Environmental impacts.

For calculating the environmental impact categories, EN 15804 +A2 methodology was based on. The results are described in Excel attached.

* Methodology for each indicator

indicator	used methodology
Climate change - total	IPCC based on IPCC 2013
Climate change - fossil fuels	IPCC based on IPCC 2013
Climate change - biogenics	IPCC based on IPCC 2013
Climate change - land use and land use transformation	IPCC based on IPCC 2013
Ozone depletion	Steady-state ODPs, WMO 2014
Acidification	Accumulated Exceedance, Seppala et al. 2006, Posch et al., 2008
Freshwater eutrophication	EUTREND model, Struijs et al., 2009b, as implemented in ReCipe
Marine aquatic eutrophication	EUTREND model, Struijs et al., 2009b, as implemented in ReCipe
Terrestrial eutrophication	Accumulated Exceedance, Seppala et al. 2006, Posch et al.
Photochemical ozone formation	LOTOS-EUROS, Van Zelm et al., 2008, as applied in ReCiPe
Resource depletion - metals and minerals	CML 2002, Guinee et al, 2002, and van Oers st al. 2002.
Resource depletion - fossils	CML 2002, Guinee et al, 2002, and van Oers st al. 2002
Water requirement	Available Water Remaining (AWARE) Boulay et al., 2016
Emission of fine particles	SETAC-UNEP, Fantke et al. 2016
Ionizing radiation, human health	Human health effect model as developed by Dreicer et al. 1995 update by Frischknecht et al., 2000
Ecotoxicity(fresh water)	Usetox version 2 until the modified USEtox model in available from EC-JRC
Human toxicity, carcinogenic effects	Usetox version 2 until the modified USEtox model in available from EC-JRC
Huamn toxicity, non-carcinogenic effects	Usetox version 2 until the modified USEtox model in available from EC-JRC
Impacts related to land use/soil quality	Soil quality index based on LANCA

** Indicators that do not have a methodology are evaluated by selecting relevant substances*

7 Life cycle Interpretation

7.1 Assumptions and limitations of the study

This study was conducted according to the following assumptions and limitations.

- For PCR, PCR-ed4-EN-2021 09 06, the PEP certification standard, was applied.
- This study is mainly analyzed by field data, collected through on-site visits to manufacturing factories and questionnaires from suppliers.
- For secondary data in this study, Ecoinvent v3.7.1 or Korea national LCI DB was used. When similar secondary data needs to be applied, the worst case was applied according to the penalizing scenario.
- In manufacturing stage, all suppliers are in Asia, so the transport distance related to parts and packaging materials was applied according to the transport scenario of PCR.
- In manufacturing stage, in the case of 'Packaging of raw materials', the amount of packaging was calculated by using the total amount of disposed materials generated from the packaging of raw materials.
- In manufacturing stage, the electricity consumption of the production line from the total electricity consumption of the facility, considered the power capacity (KW) and the production time of production lines.
- In Installation stage, the largest diameter among refrigerant pipe diameters was selected for worst-case scenario.
- For waste during installation stage, the ratio by material for 'recycled, recovered, incinerated, buried' was applied according to PCR.
- The reference lifetime of the product was 4 years according to EPD 002:2013(00):201309, Korea.
- In use stage, the total energy consumption during the use stage was calculated by using the Electric Energy consumption as PCR.
- In End-of-Life stage, as there is no evidence of recovery, the case 3 ratio from PSR-0013-ed2.0-EN-2019 12 06 is used when calculating the amount of the bare product to be treated.

7.2 Eco-design recommendations for reducing impacts.

To reduce the various environmental impacts suggested above, we are carrying out various activities.

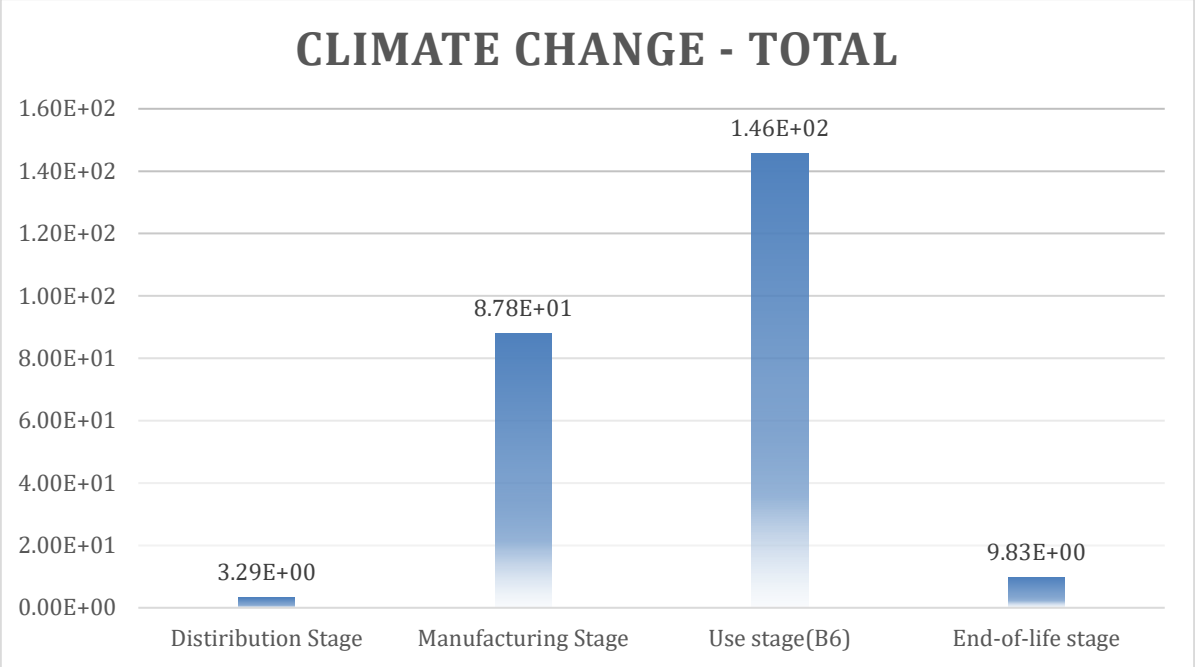
- Improving the recyclability of products and parts (ex. unification of materials, etc.)
- Use of secondary materials for products, parts, and packaging materials
- Improving energy efficiency in the use stage

7.3 Interpretation of the results

This report includes the interpretation of the results in accordance with ISO 14040.

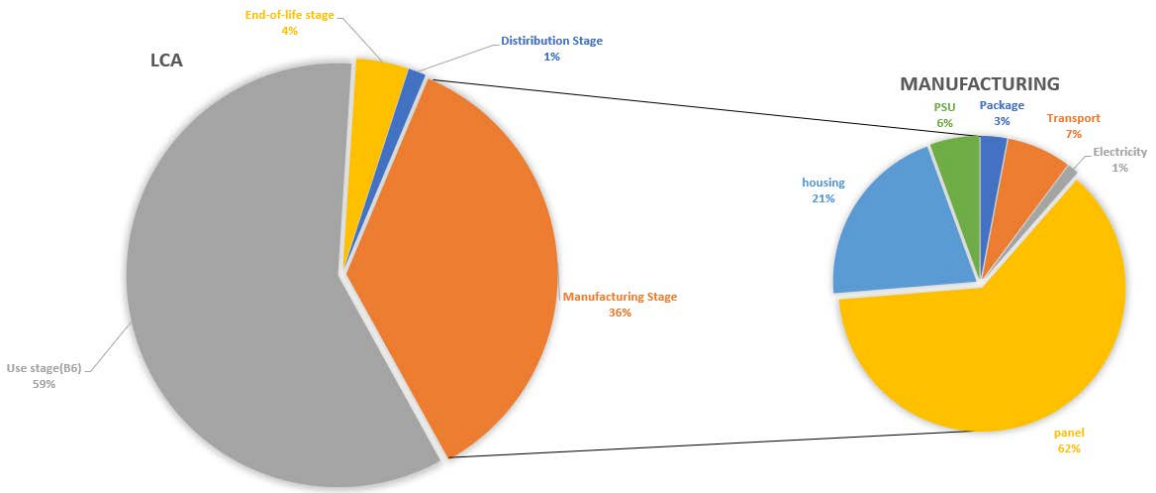
(1) Climate change - total

The impact of “climate change-total” is 2.47E+02 kgCO2 eq. Of these, the impact of the use stage(B6) accounts for more than 59.07% (1.46E+02 kgCO2 eq) of the total, and the influence of the manufacturing stage accounts for more than 35.61% (8.78E+01 kgCO2 eq) of the total.



In case of use stage, it seems the impact of total energy consumption over the life cycle (4 years) of the product for the phases of use.

In the case of the manufacturing stage, the effect of panel and housing materials is great.



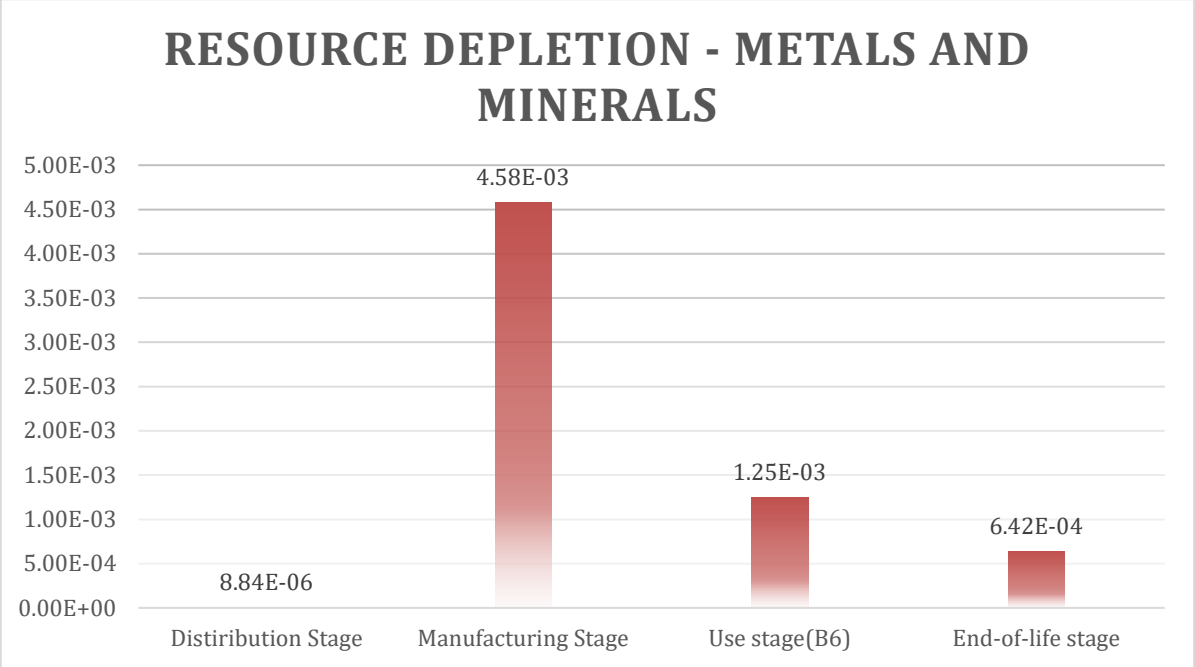
Manufacturing Stage

Package	Transport	Electricity	panel	housing	PSU	waste
2.3164.E+00	5.6386.E+00	9.8495.E-01	4.8516.E+01	1.6139.E+01	4.3518.E+00	9.8640.E+00

The power consumption at the manufacturing stage includes only the electricity used in the product assembly process, and the impact on transportation is conservatively calculated.

(2) Resource depletion - metals and minerals

The impact of "Resource depletion - metals and minerals" is 6.48E-03 kg Sb eq. This means that the impact from the manufacturing stage accounts for more than 70.65% (4.58E-03 kg Sb eq), and the impact from the use step accounts for more than 19.30% (1.25E-03 kg Sb eq).

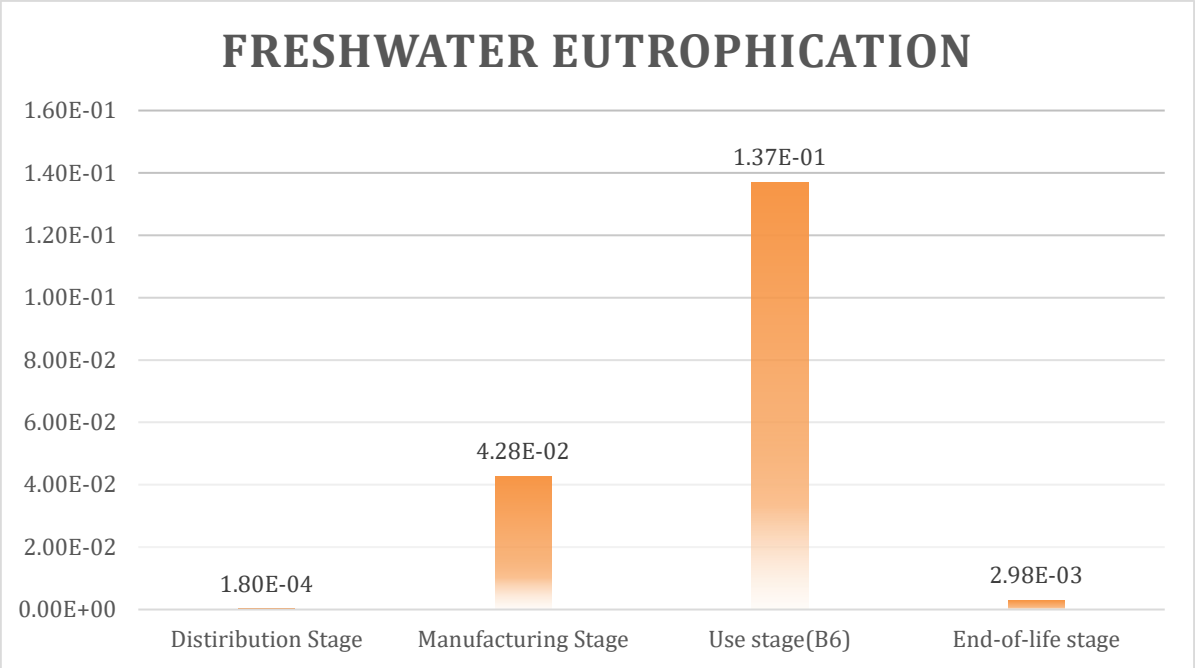


In the case of the manufacturing stage, it seems to be the impact of being composed of metal on the parts and materials constituting the product.

In the case of use stage, it seems the impact of total energy consumption over the life cycle (4 years) of the product for the phases of use.

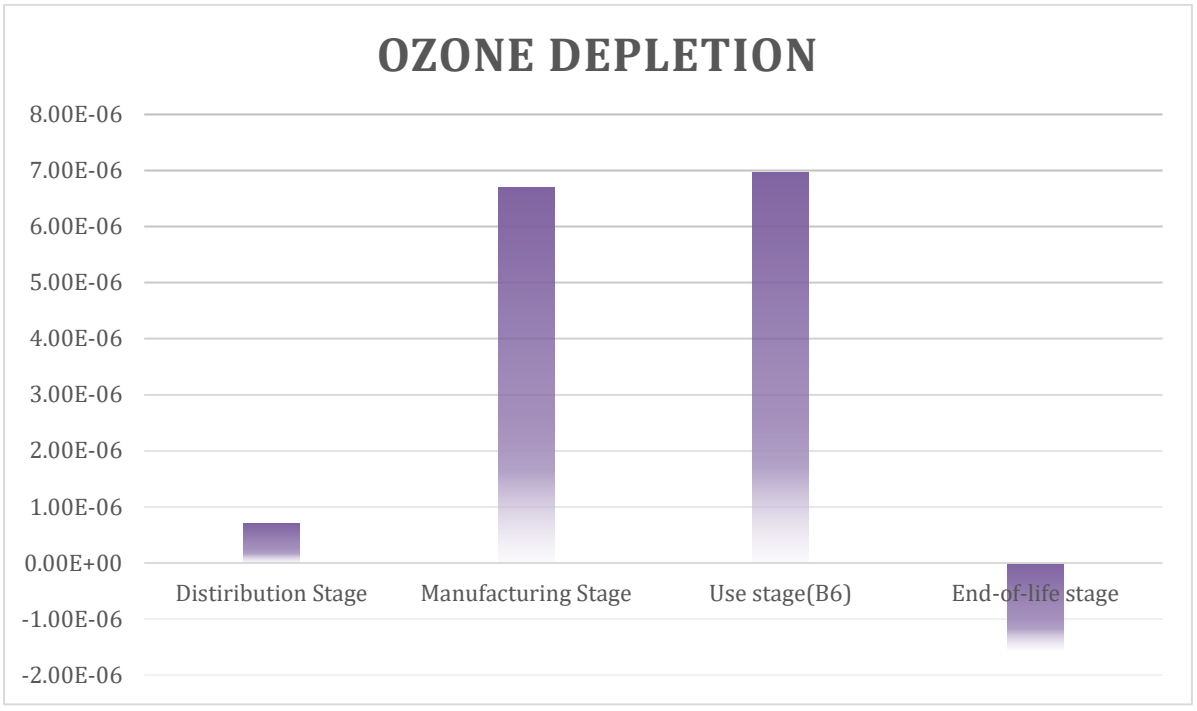
(3) Freshwater eutrophication

The impact of "Freshwater eutrophication" was found to be 1.83E-01 kg P eq. The impact from the use stage (B6) was 74.89% (1.37E-01 kg P eq) or more, and the impact from the manufacturing stage was 23.38% (4.28E-02 kg P eq) or more.

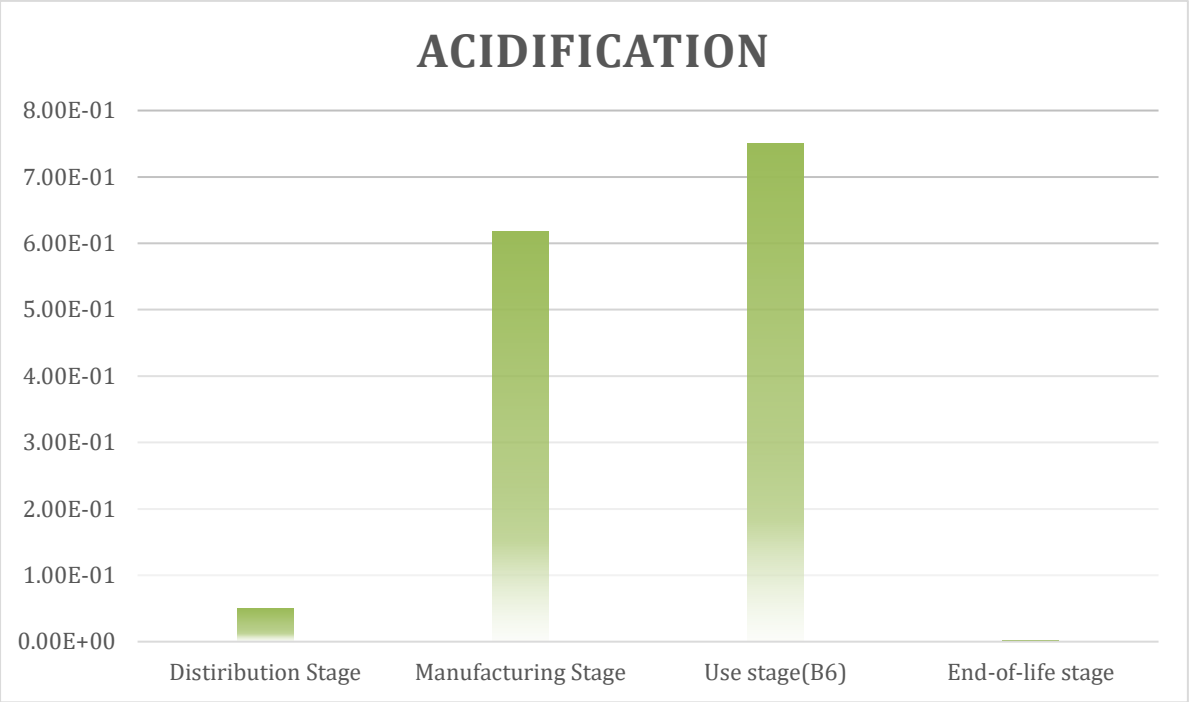


For the manufacturing stage, it seems to be due to the water consumption used in the manufacturing process of the product, and for the use phase, it seems the impact of total energy consumption over the life cycle (4 years) of the product for the phases of use.

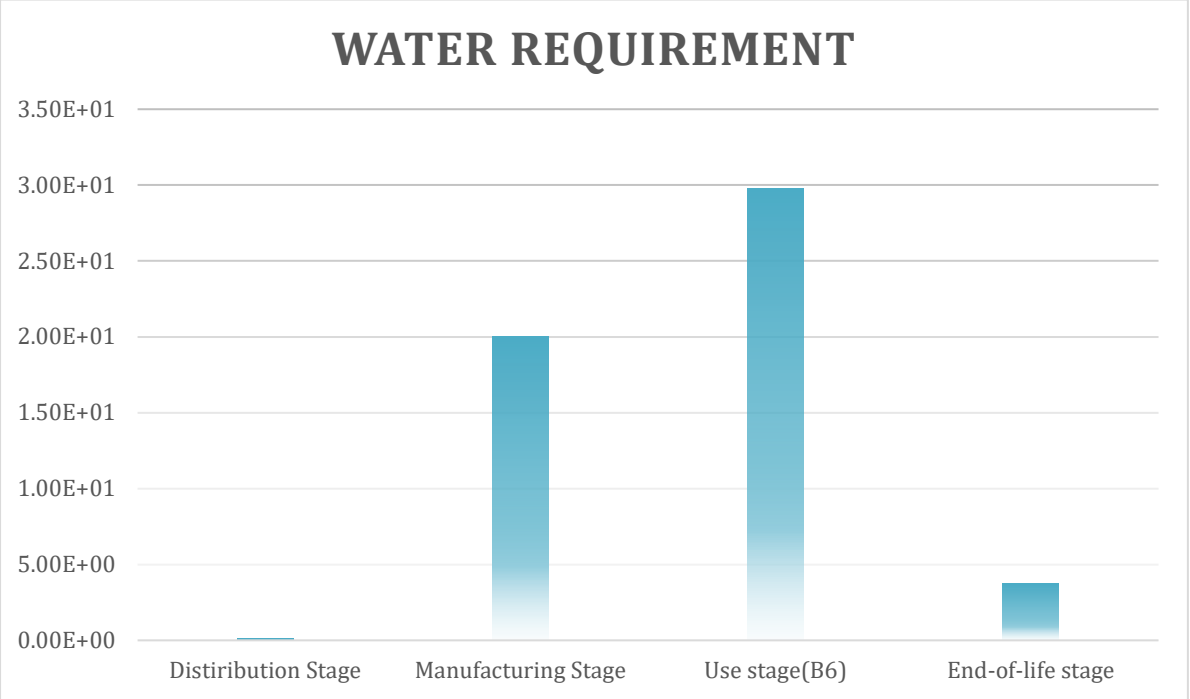
(4) Ozone depletion



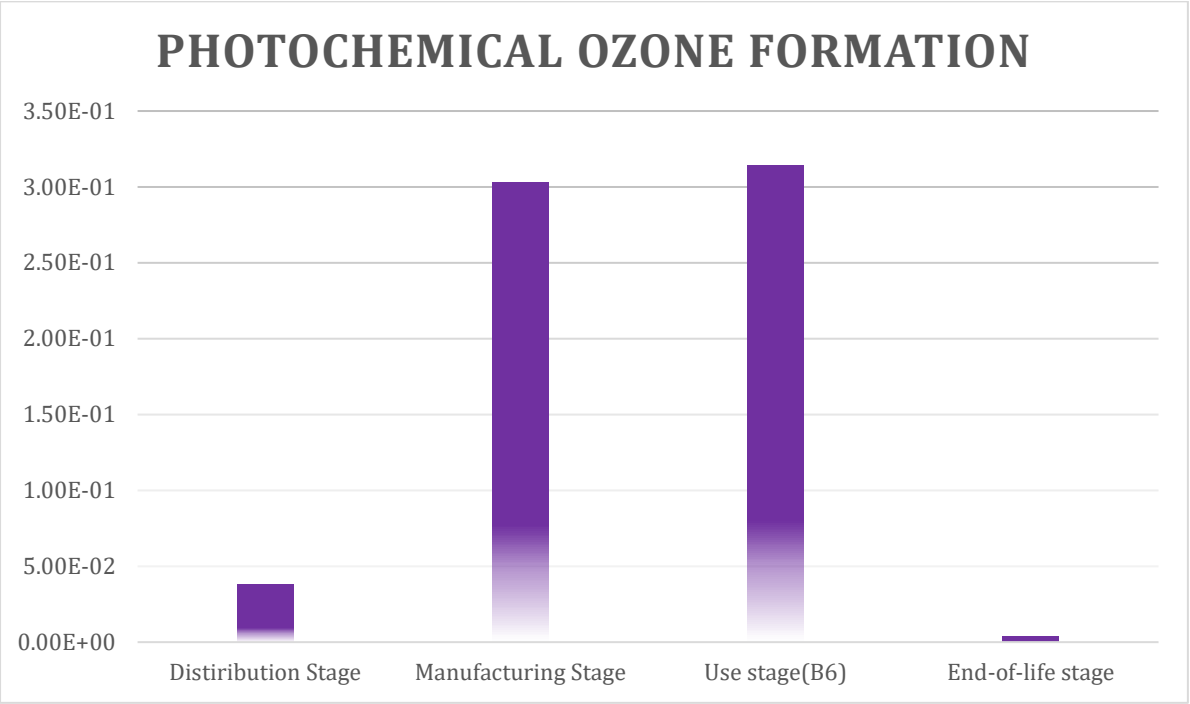
(5) Acidification



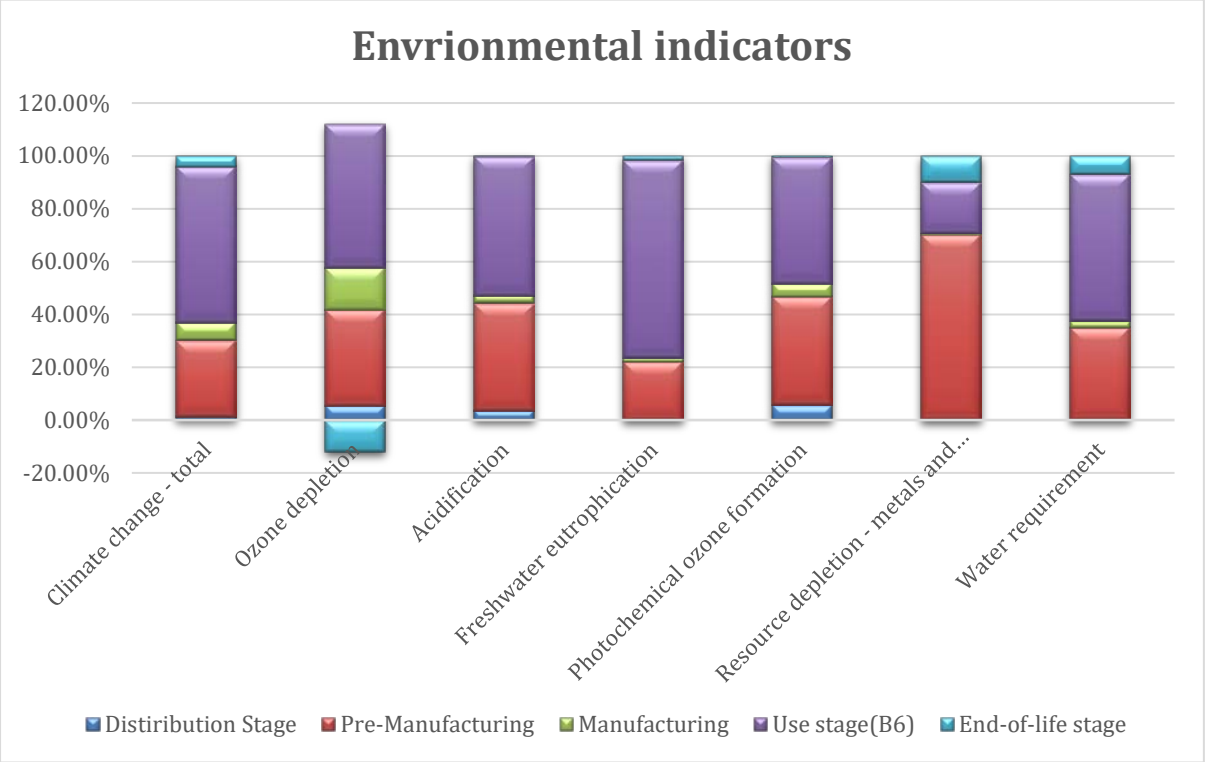
(6) Water requirement



(7) Photochemical ozone formation



(8) It is the environmental impact ratio for each impact category. It can be seen that most of the environmental impact factors account for the largest proportion of parts production among the manufacturing stages.



Appendix 1. Cut off criteria

- **24BK55YT**

Name	Unit	Mass	mass ratio	package	Data quality
Molded Pulp Packings	kg	1.80.E+00	58.15%	package	measured
Box	kg	1.15.E+00	37.15%	package	measured
Manuals(paper)	kg	9.14.E-02	2.95%	package	measured
Accessaries Packing(vinyl bag)	kg	3.12.E-02	1.01%	package	measured
Monitor packing(EPS)	kg	2.28.E-02	0.74%	package	measured
Module Plate	kg	1.08.E+00	17.39%		measured
Stand base(ABS)	kg	7.80.E-01	12.60%		measured
PCB Metal Cover	kg	5.61.E-01	9.07%		measured
Back Cover(ABS)	kg	5.15.E-01	8.32%		measured
TFT-Glass(70% glass)	kg	4.65.E-01	7.52%		measured
Light guide plate	kg	3.97.E-01	6.41%		measured
Vesa Metal	kg	3.26.E-01	5.27%		measured
Slide Metal	kg	2.23.E-01	3.60%		measured
Stand base top cover(ABS)	kg	1.96.E-01	3.17%		measured
Stand Body Inner(ABS)	kg	1.94.E-01	3.13%		measured
Power Cord	kg	1.91.E-01	3.09%		measured
LCD Bracket	kg	1.23.E-01	1.98%		measured
Power PCB assembly	kg	1.08.E-01	1.75%		measured
Stand Body Outer(ABS)	kg	1.06.E-01	1.71%		measured
Cable_DP	kg	1.01.E-01	1.64%		measured
Main PCB assembly	kg	9.68.E-02	1.56%		measured
Cabinet(ABS)	kg	9.55.E-02	1.54%		measured
Cable_HDMI	kg	7.07.E-02	1.14%		measured
Prizm sheet(1)	kg	6.05.E-02	0.98%		measured
cover swivel ring(POM)	kg	5.18.E-02	0.84%		measured
Screws	kg	4.10.E-02	0.66%		measured
Slide Rail(POM)	kg	3.52.E-02	0.57%		measured
LCD Bracket(PC-FR)	kg	3.32.E-02	0.54%		measured
cover swivel fix(ABS)	kg	3.23.E-02	0.52%		measured
Reflector sheet	kg	3.10.E-02	0.50%		measured
Vesa Metal Component(3)	kg	2.96.E-02	0.48%		measured
Prizm sheet(3)	kg	2.55.E-02	0.41%		measured
Prizm sheet(2)	kg	2.45.E-02	0.40%		measured
Source PCB	kg	2.32.E-02	0.37%		measured
Vesa Cover(ABS)	kg	2.28.E-02	0.37%		measured
Top Cover(ABS)	kg	1.99.E-02	0.32%		measured

aluminium oxide pad	kg	1.80.E-02	0.29%		measured
Hinge Cover(ABS)	kg	1.66.E-02	0.27%		measured
Speaker Cable	kg	1.46.E-02	0.24%		measured
Vesa Metal Component(1)	kg	1.42.E-02	0.23%		measured
Vesa Metal Component(2)	kg	1.31.E-02	0.21%		measured
Cable holder(ABS)	kg	9.10.E-03	0.15%		measured
Speaker Support(ABS)	kg	7.70.E-03	0.12%		measured
Slide Rail Component(POM)	kg	7.20.E-03	0.12%		measured
Back Light(Aluminum)	kg	6.40.E-03	0.10%		measured
Panel Tape	kg	4.20.E-03	0.07%		measured
FFC Cable	kg	4.20.E-03	0.07%		measured
EMI gasket	kg	3.20.E-03	0.05%		measured
Cabinet button PCB	kg	2.90.E-03	0.05%		measured
Cabinet button(ABS)	kg	2.90.E-03	0.05%		measured
Monitor inside tape	kg	2.80.E-03	0.05%		measured
Speaker Cover(ABS)	kg	2.40.E-03	0.04%		measured
Magnet	kg	2.40.E-03	0.04%		measured
Foot	kg	8.00.E-04	0.01%		measured
Cable Tie	kg	7.00.E-04	0.01%		measured
Coil	kg	1.00.E-05	0.00%		measured
PCB Metal Cover plastic	kg	0.00.E+00	0.00%		measured
Total mass	kg	9.28.E+00			
Total mass of product	kg	6.19.E+00			
Total mass of package	kg	3.10.E+00			

Appendix 2. Used Datasets

- **Manufacturing Stage**

Name	dataset	geography	source
Back Light(Aluminum)	Aluminium, primary, ingot production, RoW	Rest of World	Ecoinvent v3.7.1
Screws	steel production, converter, low-alloyed, RoW	Rest of World	Ecoinvent v3.7.1
Cable Tie	steel, unalloyed, GLO	Global	Ecoinvent v3.7.1
Coil	aluminium alloy production, Metallic Matrix Composite RoW	Rest of World	Ecoinvent v3.7.1
LCD Bracket	steel production, electric, chromium steel 18/8, RoW	Rest of World	Ecoinvent v3.7.1
Module Plate	Aluminium, primary, ingot production, RoW	Rest of World	Ecoinvent v3.7.1
PCB Metal Cover	Aluminium, primary, ingot production, RoW	Rest of World	Ecoinvent v3.7.1
Slide Metal	[환경부] 용융아연도금강판 (hot-dipped galvanized steel sheet)	KR	
Vesa Metal	[환경부] 용융아연도금강판 (hot-dipped galvanized steel sheet)	KR	
Vesa Metal Component(1)	steel production, electric, chromium steel 18/8, RoW	Rest of World	Ecoinvent v3.7.1
Vesa Metal Component(2)	steel production, electric, chromium steel 18/8, RoW	Rest of World	Ecoinvent v3.7.1
Vesa Metal Component(3)	steel production, electric, chromium steel 18/8, RoW	Rest of World	Ecoinvent v3.7.1
Accessaries Packing(vinyl bag)	Polyethylene, low density, granulate production, RoW	Rest of World	Ecoinvent v3.7.1
Box	containerboard production, linerboard, kraftliner, RoW	Rest of World	Ecoinvent v3.7.1
Foot	silicone product production, RoW	Rest of World	Ecoinvent v3.7.1
LCD Module	Liquid Crystal Display, unmounted, GLO	Global	Ecoinvent v3.7.1
Magnet	Permanent magnet, for electric motor production, GLO	Global	Ecoinvent v3.7.1
Manuals(paper)	offset printing, per kg printed paper, RoW	Rest of World	Ecoinvent v3.7.1
Molded Pulp Packings	containerboard production, linerboard, kraftliner, RoW	Rest of World	Ecoinvent v3.7.1
aluminium oxide pad	aluminium oxide production, Asia	Asia, without China and GCC	Ecoinvent v3.7.1
Speaker Cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Back Cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
cover swivel fix(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
cover swivel ring(POM)	PolyOxyMethylene production, KR	Korea	
Cabinet button(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1

Cabinet(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Cable holder(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Light guide plate	polymethyl methacrylate production, sheets, RoW	Rest of World	Ecoinvent v3.7.1
EMI gasket	Polyurethane, rigid foam, RoW	Rest of World	Ecoinvent v3.7.1
Hinge Cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
LCD Bracket(PC-FR)	polycarbonate production, RoW	Rest of World	Ecoinvent v3.7.1
Monitor inside tape	packaging film production, low density polyethylene, RoW	Rest of World	Ecoinvent v3.7.1
Monitor packing(EPS)	polystyrene production, expandable, RoW	Rest of World	Ecoinvent v3.7.1
Reflector sheet	polyethylene terephthalate production, granulate, amorphous, RoW	Rest of World	Ecoinvent v3.7.1
Panel Tape	packaging film production, low density polyethylene, RoW	Rest of World	Ecoinvent v3.7.1
PCB Metal Cover plastic	PolyOxyMethylene production, KR	Korea	Ecoinvent v3.7.1
Prizm sheet(1)	polyethylene terephthalate production, granulate, amorphous, RoW	Rest of World	Ecoinvent v3.7.1
Prizm sheet(2)	polyethylene terephthalate production, granulate, amorphous, RoW	Rest of World	Ecoinvent v3.7.1
Prizm sheet(3)	polyethylene terephthalate production, granulate, amorphous, RoW	Rest of World	Ecoinvent v3.7.1
Slide Rail Component(POM)	PolyOxyMethylene production, KR	Korea	
Slide Rail(POM)	PolyOxyMethylene production, KR	Korea	
Speaker Support(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Stand base top cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Stand base(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Stand Body Inner(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Stand Body Outer(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Top Cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Vesa Cover(ABS)	acrylonitrile-butadiene-styrene copolymer production, RoW	Rest of World	Ecoinvent v3.7.1
Cabinet button PCB	[지식경제부]인쇄회로기판(Printed circuit board)	Korea	
Cable_DP	cable production, unspecified, GLO	Global	Ecoinvent v3.7.1
FFC Cable	cable production, unspecified, GLO	Global	Ecoinvent v3.7.1
Cable_HDMI	cable production, unspecified, GLO	Global	Ecoinvent v3.7.1
Main PCB assembly	[지식경제부]인쇄회로기판(Printed circuit board)	Korea	
Power Cord	cable production, unspecified, GLO	Global	Ecoinvent v3.7.1

Power PCB assembly	[지식경제부]인쇄회로기판(Printed circuit board)	Korea	
Source PCB	[지식경제부]인쇄회로기판(Printed circuit board)	Korea	
Speaker Cable	cable production, unspecified, GLO	Global	Ecoinvent v3.7.1
TFT-Glass(70% glass)	Panel glass, for cathode ray tube display production, Glo	Global	Ecoinvent v3.7.1
Electricity, CN	market for electricity, low voltage, CN-CSG	CN-CSG	Ecoinvent v3.7.1
Recycling of Monitor packing(EPS)	treatment of waste polyethylene terephthalate, for recycling, unsorted, sorting, RoW	Rest of World	Ecoinvent v3.7.1
Recycling of LDPE vinyl	treatment of waste polyethylene terephthalate, for recycling, unsorted, sorting, RoW	Rest of World	Ecoinvent v3.7.1
Incineration of LDPE vinyl	treatment of waste polyethylene, municipal incineration, RoW	Rest of World	Ecoinvent v3.7.1
Incineration of Box	treatment of waste paper board, municipal incineration, RoW	Rest of World	Ecoinvent v3.7.1
Non-hazardous waste, incineration_Manufacturing Stage	treatment of municipal solid waste, incineration, RoW	Rest of World	Ecoinvent v3.7.1
Non-hazardous waste, buried_Manufacturing Stage	treatment of municipal solid waste, sanitary landfill, RoW	Rest of World	Ecoinvent v3.7.1
Hazardous waste, incineration_Manufacturing Stage	treatment of hazardous waste, hazardous waste incineration, RoW	Rest of World	Ecoinvent v3.7.1
[transport, road, lorry]	transport, freight, lorry 16-32 metric ton, EURO5, RoW	Rest of World	Ecoinvent v3.7.1
Electricity	Electricity, high voltage electricity, high voltage, production mix, CN-JS	CN-JS	Ecoinvent v3.7.1

- **Distribution Stage**

Name	dataset	geography	source
[transport, road]-CN	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}| transport, freight, lorry 16-32 metric ton, EURO5	Rest of World	Ecoinvent v3.7.1
[transport, sea]-GLO	Transport, freight, sea, container ship {GLO}| transport, freight, sea, container ship	Global	Ecoinvent v3.7.1
[transport, road]-EU	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}| transport, freight, lorry 16-32 metric ton, EURO5	Rest of World	Ecoinvent v3.7.1

- **Use**

Name	dataset	geography	source
Electricity	market for electricity, low voltage, RER	Europe	Ecoinvent v3.7.1

- **End-of-Life Stage**

Name	dataset	geography	source
PET, recycled	waste plastic, consumer electronics, unsorted, Recycled Content cut-off, GLO	GLO	Ecoinvent v3.7.1
other plastics, Recycled	treatment of waste polyethylene terephthalate, for recycling, unsorted, sorting, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Plastic, recovered	treatment of waste plastic, mixture, municipal incineration, RoW	RoW	Ecoinvent v3.7.1
Plastic, incinerated	treatment of waste plastic, mixture, municipal incineration, RoW	RoW	Ecoinvent v3.7.1
Plastic, buried	treatment of waste plastic, mixture, sanitary landfill, RoW	RoW	Ecoinvent v3.7.1
Metal, recycled	treatment of metal scrap, mixed, for recycling, unsorted, sorting, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Aluminium, recycled	treatment of aluminium scrap, post-consumer, prepared for recycling, at remelter, RER	Europe	Ecoinvent v3.7.1
Metal, recovered	treatment of scrap steel, municipal incineration, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Aluminium, recovered	treatment of scrap aluminium, municipal incineration, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Metal, incinerated	treatment of scrap steel, municipal incineration, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Aluminium, incinerated	treatment of scrap aluminium, municipal incineration, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Metal, buried	treatment of scrap steel, inert material landfill, sorting, Europe without Switzerland	Europe without Switzerland	Ecoinvent v3.7.1
Aluminium, buried	treatment of waste aluminium, sanitary landfill, RoW	RoW	Ecoinvent v3.7.1
Others(PWB), Recycled	treatment of scrap printed wiring boards, shredding and separation, RoW	RoW	Ecoinvent v3.7.1
Others(Paper), Recycled	graphic paper production, 100% recycled, RER	Europe	Ecoinvent v3.7.1
Others, Recycled	treatment of waste polyethylene terephthalate, for recycling, unsorted, sorting, Europe without Switzerland	Europe without Swizterland	Ecoinvent v3.7.1
Others(PWB), recovered	treatment of waste plastic, mixture, municipal incineration, RoW	RoW	Ecoinvent v3.7.1
Others, recovered	treatment of municipal solid waste, incineration, CA-QC	CA-QC	Ecoinvent v3.7.1
Others(PWB), incinerated	treatment of waste plastic, mixture, municipal incineration, RoW	RoW	Ecoinvent v3.7.1
Others, incinerated	treatment of municipal solid waste, incineration, CA-QC	CA-QC	Ecoinvent v3.7.1
Others(PWB), buried	treatment of waste plastic plaster, sanitary landfill, RoW	RoW	Ecoinvent v3.7.1
Others, buried	treatment of municipal solid waste, sanitary landfill, CA-QC	CA-QC	Ecoinvent v3.7.1
[transport, road]	transport, freight, lorry 7.5-16 metric ton, EURO 05, RER	Europe	Ecoinvent v3.7.1

Appendix 3. Manufacturing Stage – Components

- **24BK55YT**

Packing assembly	3.004	kg		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Box	containerboard	1.15.E+00	kg
Raw material	Molded Pulp Packings	containerboard	1.80.E+00	kg
Raw material	Monitor packing(EPS)	EPS	2.28.E-02	kg
Process	Monitor packing(EPS)	EPS	2.28.E-02	kg
Raw material	Accessaries Packing(vinyl bag)	plastic film	3.12.E-02	kg
Process	Accessaries Packing(vinyl bag)	plastic film	3.12.E-02	kg
Product	Packing assembly		3.00.E+00	kg

Manual (Accessory)	0.091	kg		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Manuals(paper)	Printed paper	9.14.E-02	kg
Product	Manual (Accessory)		9.14.E-02	kg

Cable(Accessory)	0.373	kg		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Power Cord	Wire harness	1.91.E-01	kg
Raw material	Cable_HDMI	Wire harness	7.07.E-02	kg
Raw material	Cable_DP	Wire harness	1.01.E-01	kg
Raw material	Cable Tie	Steel	7.00.E-04	kg
Process	Cable Tie	Steel	7.00.E-04	kg
Raw material	Cable holder(ABS)	ABS	9.10.E-03	kg
Process	Cable holder(ABS)	ABS	9.10.E-03	kg
Product	Cable(Accessory)		3.73.E-01	kg

PCB assembly	0.226	kg		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	aluminium oxide pad	aluminium oxide	1.80.E-02	kg
Raw material	Power PCB assembly	Printed Circuit Board	1.08.E-01	kg
Raw material	Main PCB assembly	Printed Circuit Board	9.68.E-02	kg

Raw material	EMI gasket	Polyurethane	3.20.E-03	kg
Product	PCB assembly		2.26.E-01	kg

Stand assembly		**2.068**	**kg**
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Stand base top cover(ABS)	ABS	1.96.E-01	kg
Process	Stand base top cover(ABS)	ABS	1.96.E-01	kg
Raw material	Stand base(ABS)	ABS	7.80.E-01	kg
Process	Stand base(ABS)	ABS	7.80.E-01	kg
Raw material	cover swivel fix(ABS)	ABS	3.23.E-02	kg
Process	cover swivel fix(ABS)	ABS	3.23.E-02	kg
Raw material	cover swivel ring(POM)	POM; Polyoxymethylene	5.18.E-02	kg
Process	cover swivel ring(POM)	POM; Polyoxymethylene	5.18.E-02	kg
Raw material	Foot	Silicone	8.00.E-04	kg
Process	Foot	Silicone	8.00.E-04	kg
Raw material	Stand Body Outer(ABS)	ABS	1.06.E-01	kg
Process	Stand Body Outer(ABS)	ABS	1.06.E-01	kg
Raw material	Stand Body Inner(ABS)	ABS	1.94.E-01	kg
Process	Stand Body Inner(ABS)	ABS	1.94.E-01	kg
Raw material	Vesa Cover(ABS)	ABS	2.28.E-02	kg
Process	Vesa Cover(ABS)	ABS	2.28.E-02	kg
Raw material	Top Cover(ABS)	ABS	1.99.E-02	kg
Process	Top Cover(ABS)	ABS	1.99.E-02	kg
Raw material	Hinge Cover(ABS)	ABS	1.66.E-02	kg
Process	Hinge Cover(ABS)	ABS	1.66.E-02	kg
Raw material	Vesa Metal	Galvanized steel sheet	3.26.E-01	kg
Process	Vesa Metal	Galvanized steel sheet	3.26.E-01	kg
Raw material	Vesa Metal Component(1)	Stainless steel	1.42.E-02	kg
Process	Vesa Metal Component(1)	Stainless steel	1.42.E-02	kg
Raw material	Vesa Metal Component(2)	Stainless steel	1.31.E-02	kg
Process	Vesa Metal Component(2)	Stainless steel	1.31.E-02	kg
Raw material	Vesa Metal Component(3)	Stainless steel	2.96.E-02	kg
Process	Vesa Metal Component(3)	Stainless steel	2.96.E-02	kg
Raw material	Slide Rail(POM)	POM; Polyoxymethylene	3.52.E-02	kg
Process	Slide Rail(POM)	POM; Polyoxymethylene	3.52.E-02	kg
Raw material	Slide Rail Component(POM)	POM; Polyoxymethylene	7.20.E-03	kg
Process	Slide Rail Component(POM)	POM; Polyoxymethylene	7.20.E-03	kg
Raw material	Slide Metal	Galvanized steel sheet	2.23.E-01	kg

Process	Slide Metal	Galvanized steel sheet	2.23.E-01	kg
Product	Stand assembly		2.07.E+00	kg

Back Cover assembly	**0.556**	**kg**		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Back Cover(ABS)	ABS	5.15.E-01	kg
Process	Back Cover(ABS)	ABS	5.15.E-01	kg
Raw material	Screws	Steel (SWRCH)	4.10.E-02	kg
Process	Screws	Steel (SWRCH)	4.10.E-02	kg
Product	Back Cover assembly		5.56.E-01	kg

Cabinet assembly	**0.101**	**kg**		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Cabinet(ABS)	ABS	9.55.E-02	kg
Process	Cabinet(ABS)	ABS	9.55.E-02	kg
Raw material	Cabinet button(ABS)	ABS	2.90.E-03	kg
Process	Cabinet button(ABS)	ABS	2.90.E-03	kg
Raw material	Cabinet button PCB	Printed Circuit Board	2.90.E-03	kg
Product	Cabinet assembly		1.01.E-01	kg

FFC Cable assembly	**0.004**	**kg**		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	FFC Cable	Wire harness	4.20.E-03	kg
Product	FFC Cable assembly		4.20.E-03	kg

Speaker assembly	**0.027**	**kg**		
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Speaker Cable	Wire harness	1.46.E-02	kg
Raw material	Speaker Support(ABS)	ABS	7.70.E-03	kg
Process	Speaker Support(ABS)	ABS	7.70.E-03	kg
Raw material	Coil	Lead wire	1.00.E-05	kg
Process	Coil	Lead wire	1.00.E-05	kg
Raw material	Magnet	Magnet	2.40.E-03	kg

Raw material	Speaker Cover(ABS)	ABS	2.40.E-03	kg
Process	Speaker Cover(ABS)	ABS	2.40.E-03	kg
Product	Speaker assembly		2.71.E-02	kg

LCD Module assembly		**1.830**	**kg**
Group	**Name**	**Material**	**Qty**	**Unit**
Raw material	Monitor inside tape	PET film	2.80.E-03	kg
Raw material	PCB Metal Cover plastic	POM; Polyoxymethylene	0.00.E+00	kg
Process	PCB Metal Cover plastic	POM; Polyoxymethylene	0.00.E+00	kg
Raw material	PCB Metal Cover	Aluminum Metal	5.61.E-01	kg
Process	PCB Metal Cover	Aluminum Metal	5.61.E-01	kg
Raw material	LCD Bracket(PC-FR)	Polycarbonate	3.32.E-02	kg
Process	LCD Bracket(PC-FR)	Polycarbonate	3.32.E-02	kg
Raw material	Back Light(Aluminum)	Aluminum Metal	6.40.E-03	kg
Process	Back Light(Aluminum)	Aluminum Metal	6.40.E-03	kg
Raw material	Module Plate	Aluminum Metal	1.08.E+00	kg
Process	Module Plate	Aluminum Metal	1.08.E+00	kg
Raw material	Source PCB	Printed Circuit Board	2.32.E-02	kg
Raw material	LCD Bracket	Stainless steel	1.23.E-01	kg
Process	LCD Bracket	Stainless steel	1.23.E-01	kg
Raw material	Panel Tape	PET film	4.20.E-03	kg
Product	LCD Module assembly		1.83.E+00	kg

LCD assembly		**1.003**	**kg**
Group	**Name**	**Material**	**Qty**	**Unit**
	TFT-Glass(70% glass)	Panel glass	4.65.E-01	kg
Raw material	Prizm sheet(1)	PET(Poly ethylene terephthalate)	6.05.E-02	kg
Process	Prizm sheet(1)	PET(Poly ethylene terephthalate)	6.05.E-02	kg
Raw material	Prizm sheet(2)	PET(Poly ethylene terephthalate)	2.45.E-02	kg
Process	Prizm sheet(2)	PET(Poly ethylene terephthalate)	2.45.E-02	kg
Raw material	Prizm sheet(3)	PET(Poly ethylene terephthalate)	2.55.E-02	kg
Process	Prizm sheet(3)	PET(Poly ethylene terephthalate)	2.55.E-02	kg
Raw material	Reflector sheet	PET(Poly ethylene terephthalate)	3.10.E-02	kg
Process	Reflector sheet	PET(Poly ethylene terephthalate)	3.10.E-02	kg
Raw material	Light guide plate	PMMA(Polymethyl methacrylate)	3.97.E-01	kg

Process	Light guide plate	PMMA(Polymethyl methacrylate)	3.97.E-01	kg
Product	LCD assembly		1.00.E+00	kg

Appendix 4. Results of environmental impact

*** Per product**

Category	Unit (/product)	Stage				
		Total	Distiribution Stage	Manufacturing Stage	Use stage(B6)	End-of-life stage
Climate change - total	kg CO2 eq	2.47E+02	3.29E+00	8.78E+01	1.46E+02	9.83E+00
Climate change - fossil fuels	kg CO2 eq	2.32E+02	3.28E+00	8.51E+01	1.37E+02	6.04E+00
Climate change - biogenics	kg CO2 eq	1.44E+01	4.73E-03	2.72E+00	7.86E+00	3.79E+00
Climate change - land use and land use transformation	kg CO2 eq	3.42E-01	1.58E-03	6.15E-02	2.85E-01	-5.94E-03
Ozone depletion	kgCFC-11 eq	1.28E-05	7.08E-07	6.69E-06	6.97E-06	-1.55E-06
Acidification	mole H+ eq	1.42E+00	5.01E-02	6.18E-01	7.51E-01	2.33E-03
Freshwater eutrophication	kg P eq	1.83E-01	1.80E-04	4.28E-02	1.37E-01	2.98E-03
Marine aquatic eutrophication	kg N eq	2.59E-01	1.28E-02	1.06E-01	1.30E-01	9.13E-03
Terrestrial eutrophication	mole N eq	2.34E+00	1.42E-01	1.01E+00	1.15E+00	4.10E-02
Photochemical ozone formation	kg NMVOC eq	6.58E-01	3.79E-02	3.02E-01	3.14E-01	3.51E-03
Resource depletion - metals and minerals	kg Sb eq	6.48E-03	8.84E-06	4.58E-03	1.25E-03	6.42E-04
Resource depletion - fossils	MJ	3.92E+03	4.65E+01	9.44E+02	2.86E+03	6.50E+01
Water requirement (deprivation world wide)	m3 eq.	5.36E+01	1.15E-01	2.00E+01	2.98E+01	3.72E+00
Emission of fine particles	incidence of diseases	6.72E-06	1.77E-07	4.47E-06	2.22E-06	-1.43E-07
Ionizing radiation, human health	kBq U235 eq	8.26E+01	2.28E-01	4.09E+00	7.63E+01	2.06E+00
Ecotoxicity(fresh water)	CTUe	5.57E+03	3.35E+01	3.16E+03	1.82E+03	5.65E+02
Human toxicity, carcinogenic effects	CTUh	1.80E-07	1.68E-09	1.06E-07	5.41E-08	1.78E-08
Huamn toxicity, non-carcinogenic effects	CTUh	3.75E-06	2.94E-08	2.22E-06	1.43E-06	7.00E-08
Impacts related to land use/soil quality	without dimension	9.87E+02	2.29E+01	2.90E+02	4.92E+02	1.81E+02