Life Cycle Assessment Report

Company name:
EIZO Corporation

Product:
LCD Monitor
FlexScan EV3240X

Date:
May 19th, 2023

Life Cycle Assessment Report

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Abbreviation

AP: Acidification Potential
EP: Eutrophication Potential
EPD: Environmental Product Declaration
GWP: Global Warming Potential
LCA: Life Cycle Assessment
LCI: Life Cycle Inventory analysis
LCIA: Life Cycle Impact Assessment
ODP: Ozone Layer Depletion Potential
PCR: Product Category Rules
POCP: Photochemical ozone creation potential

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1. General

1.1. General information

This LCA study has been performed by EIZO Corporation and has been conducted according to the requirement of the below standard and PCRs.

- ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- EPD 004: Monitor [2013/00/201309], Product Category Rules (PCR) for Monitor

1.2. Goal of study

The goal of performing this LCA study is to publish an EPD based on ISO 14040, 14044 and ISO 14025.
This is a cradle-to-grave study.
This LCA study is not comparative assertion.

1.3. Intended audiences and intended use

The intentions of this LCA study are to communicate environmentally related information with business users and consumers who are located in Japan, and to show future improvement options to internal product development and manufacturing divisions.

1.4. Functional Unit

The functional unit is defined as one unit of 31.5 - inch LCD monitor.

2. Product

2.1. Product Information

The 31.5-inch FlexScan EV3240X, frameless monitor feature 4K UHD resolution (3840 x 2160 pixels) and is equipped with USB Type-C connectivity for supporting streamlined viewing and operation in the modern workspace. The monitor achieves exemplary ergonomics, energy-savings, and sustainability to lessen impact on the environment.

2.2. Application

This product is suited to general purposes like creating documents, viewing multimedia content.

2.3. Product Environmental Information

EV2740X was certified EPA ENERGY STAR Ver.8.0, TCO Certified Generation 9, EPEAT(IEEE1680.1-2018) , TUV/Ergonomie, TUV/Low blue light content, TUV/Flicker Free, RoHS, WEEE and China RoHS.

2.4. Company Environmental Activities

Although global environmental standards such as TCO Certified and EPEAT are not legal regulations, we have actively participated and adapted from the beginning of the standard to improve the environmental performance of our products.

2.5. Technical data

LCD Panel	Type	IPS
	Backlight	LED
	Size	31.5" / 80.0 cm
	Resolution	3840 x 2160 (16:9 aspect ratio)
	Viewable Image Size (H x V)	697.3 mm x 392.2 mm
	Pixel Pitch	0.182 mm x 0.182 mm
	Display Colors	16.77 million
	Viewing Angle (H / V, typical)	178˚ / 178˚
	Brightness (typical)	350 cd/m2
	Response Time (typical)	5 ms (gray-to-gray)
Video Signals	Input Terminals	USB-C (DisplayPort Alt Mode, HDCP 2.3/1.3), DisplayPort (HDCP 2.3/1.3), HDMI (HDCP 2.3/1.4) x 2
	Digital Scanning Frequency (H / V)	USB-C : 31 kHz - 134 kHz / 29 Hz - 61 Hz
		DisplayPort : 31 kHz - 134 kHz / 29 Hz - 61 Hz
		HDMI: 31 kHz - 135 kHz / 29 Hz - 61 Hz
USB	Upstream	USB 5Gbps: Type-B, Type-C (DisplayPort Alt Mode, Power Delivery Source 94 W max.)
	Downstream	USB 5Gbps: Type-A x 3, Type-C (Type-C Curent,15 W max.)
Audio	Speakers	2.0 W + 2.0 W
	Input Terminals	USB-C, DisplayPort, HDMI x 2
	Output Terminals	Headphone (Stereo mini jack), Line out (Stereo mini jack)
Power	Power Requirements	100 - 240 VAC , 50 / 60 Hz
	Typical Power Consumption	18 W
	Maximum Power Consumption	196 W
	Power Save Mode	0.35 W or less
Physical Specifications	Dimensions (Landscape, W x H x D)	712.2 mm x 427.3 - 622.2 mm x 242.2 - 250.7 mm
	Net Weight	9.4kg
Environmental Requirements	Temperature	5 ˚C - 35 ˚C
	Humidity	20 % - 80 % R.H. (no condensation)

2.6. Material inventory

Component/Material	Weight (g)	Weight (%)	Notes
UNIT-LCD	3160.5	31.6%	Inclusion
ASSY-STAND	2750	27.5%	Inclusion
ASSY-PCB-POWER	927.5	9.3%	Inclusion
MLD-REAR-COVER	890.5	8.9%	Inclusion
ASSY PCB-MAIN	704	7.0%	Inclusion
MLD-MID-COVER	419.5	4.2%	Inclusion
MTL-MT-COVER	267.8	2.7%	Inclusion
CORD-AC	229.2	2.3%	Inclusion
CABLE-CONNECTER	118.5	1.2%	Inclusion
CABLE	114.3	1.1%	Inclusion
MTL-VESA-PLATE	105.2	1.1	Exclusion
Cable	70	0.7	Exclusion
Speaker	42.7	0.4	Exclusion
Manuals	42.7	0.4	Exclusion
Sheets	34.8	0.3	Exclusion
Harnesses	33.3	0.3	Exclusion
Plastic Moldings	25.6	0.3	Exclusion
Circuit boad	24.8	0.2	Exclusion
Metal Parts	17.9	0.2	Exclusion
Others	14.1	0.1	Exclusion

Packaging

Component/Material	Weight (g)	Weight (%)	Notes
CARTON-32W-6-CB	1970	44.5%	Inclusion
CUSHION-32W-7-T-PM	980	22.1%	Inclusion
CUSHION-32W-7-B-PM	920	20.8%	Inclusion
FRONT-PAD-CB	460	10.4%	Inclusion
Others	99.8	2.3%	Exclusion

2.7. Manufacturing Location

Factory name	Address
EIZO Corporation	153 Shimokashiwano, Hakusan, Ishikawa 924-8566 Japan
EIZO MS Corporation (Unit board)	37-9-Re Jike, Hakui, Ishikawa 925-8566 Japan

2.8. Transportation

Path	Geographical information		Volume (ton)	Distance (km)
	Departure	Arrival		
10t truck	Hakusan, Ishikawa	Tokyo	47.2	600
4t truck	Hakusan, Ishikawa	Tokyo	66.1	600
10t truck	Hakusan, Ishikawa	Osaka	10.3	450
4t truck	Hakusan, Ishikawa	Osaka	19.4	450
10t truck	Hakusan, Ishikawa	Nagoya	6.8	400
4t truck	Hakusan, Ishikawa	Nagoya	7.6	400
10t truck	Hakusan, Ishikawa	Fukuoka	15.8	900
4t truck	Hakusan, Ishikawa	Fukuoka	0.9	900

2.9. Use Phase

Usage time (hours/day)			Life time (year)	Usage day (days/year)
On mode	Standby mode	Off mode		
9.6 (40%)	1.2 (5%)	13.2 (55%)	4	365

Power consumption (W)			Total Power Consumption (kWh)
On mode	Standby mode	Off mode	
18 W	0.5 W	0 W	252.9 kWh

2.10. Disposal Stage

Component/Material	Weight (%)	Recycle	Incineration	Landfill
Plastic	26.7%	86%	8%	6%
Iron	25.4%	86%	-	14%
Paper	23.1%	95%	5%	-
Glass	4.6%	-	-	100%
Aluminum	16.8%	86%	-	14%
Copper	1.5%	86%	-	14%
Other material	1.6%	-	-	100%
Other metal	0.3%	-	-	100%

3. LCA Study

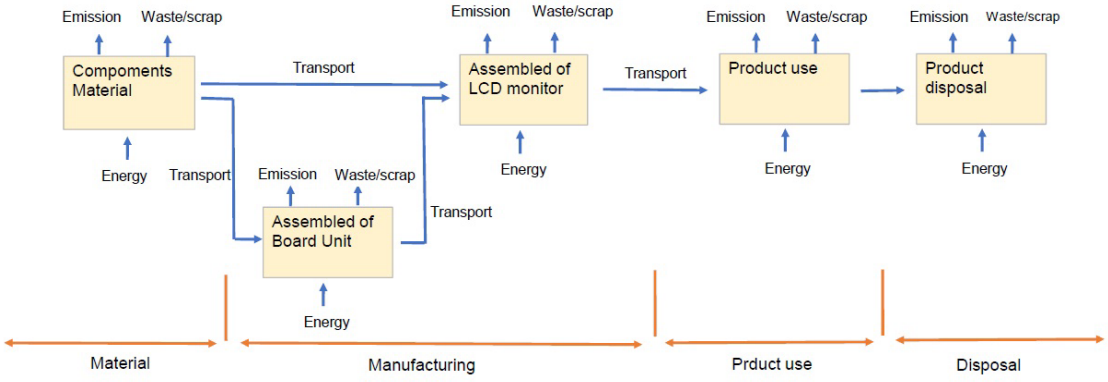
3.1. System boundary

The system boundary includes all life cycle stages Collecting Raw materials, Manufacturing, Distribution, Use and Disposal.

Stage Prior to Manufacturing	Collecting Raw Materials	X
Stage of Manufacturing	Manufacturing	X
	Distribution	X
Stage of Use	Use	X
Stage of Scrapping	Disposal	X

X=included

Follow-chart



3.2. Cut-off rules

Material Inventory survey was conducted on 95 wt. % of material in each Product / Package.
Disposal stage survey was conducted on 95 wt. % of material in each Product / Package.

3.3. LCA Data

For Life Cycle Assessment, SimaPro release 9 software system has been used. Ecoinvent 3 datasets have been taken from SimaPro release 9 software database.

EIZO collects
Materials: Use spec sheet values
Transport: Measured the distance on map
Energy: Used electricity bill invoice value

3.4. Data quality

All foreground data were collected at Hakusan and Hakui Plant Between April 1, 2021 and March 31, 2022 (One year average data).

Background data ware used from ECOINVENT 3 database (The data version is 2020).

3.5. Allocation

The electric power used in the factory for manufacturing an EV3240X was calculated by allocating EV3240X weight from the total weight of the monitor produced in one year (monitor mass x number of production) of this factory.

The electric power used in the PCB board factory for manufacturing an EV3240X PCB board was allocated from the production ratio of small, medium, and large monitors for one year and its representative mass of the PCB board.

3.6. Assumption and Limitation

Assumption

The on-mode power consumption when using this monitor was used the power consumption value of EIZO's Typical Power Consumption specifications.
For transportation, we picked up four major cities, Tokyo, Osaka, Nagoya and Fukuoka.
Glass and other materials/metals were assumed to be 100% landfilled.

Limitation

The study results are limited to a specific use scenario and real-world use of the monitor may significantly change the result
Materials are represented by industry average data, not primary supplier data. To the extent that material/components suppliers may not be average, the results might significantly change.

4. LCA Results

4.1. LCIA methodology

LCIA was calculated by using CML is developed by the Institute of Environmental Sciences Leiden University, the Netherlands.

https://www.universiteitleiden.nl/en/science/environmental-sciences/tools-and-data#CML_IA

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of the thresholds, safety margins or risks.

Impact category	Unit	Model
Global warming potential (GWP 100)	kg-CO_2eq	IPCC
Ozone depletion potential (ODP)	kg-CFC-11eq	WMO
Eutrophication potential (EP)	kgPO_4^{3-}eq	Heijungs et al.
Acidification potential (AP)	kg-SO_2eq	Hauschild and Wenzel
Photochemical oxidant creation potential (POCP)	kg-C_2H_4eq	Jenkin and Hayman
Abiotic depletion potential (ADP)	Kg-Sbeq	Guinee et al.

4.2. Life cycle Environmental Impact Assessment Result

Impact Category	Units	Total	Raw Material	Manufacturing	Transportation	Use	Disposal
GWP	kg-CO_2eq	4.63.E+02	2.98.E+02	3.34.E+00	3.26.E+00	1.56.E+02	2.16.E+00
ODP	kg-CFC-11eq	2.34.E-05	1.97.E-05	5.82.E-08	4.82.E-07	3.03.E-06	6.98.E-08
EP	kgPO_4^{3-}eq	1.70.E+00	1.54.E+00	3.11.E-03	1.87.E-03	1.55.E-01	1.30.E-03
AP	kg-SO_2eq	4.21.E+00	3.46.E+00	1.49.E-02	8.46.E-03	7.22.E-01	2.05.E-03
POCP	kg-C_2H_4eq	1.79.E-01	1.47.E-01	6.15.E-04	4.19.E-04	2.99.E-02	8.44.E-05
ADP	Kg-Sbeq	3.53.E+00	2.36.E+00	2.41.E-02	2.32.E-02	1.13.E+00	3.54.E-03

5. Interpretation

5.1. Completeness

Since we have made a 5% cut-off, the raw material should be an additional 5%. In the GWP impact index, Row material accounts for 64.4 % of total emissions. Therefore, the total impact will increase by 3.2 %.

The materials within 5% are small parts, sheets and labels made of general plastics, and copper harnesses, paper prints, metal, screws, etc.

They do not include anything that has a major impact on the environment.

Raw material's impact of GWP	CO2 increased amount by additional 5% Raw material	Impact to GWP by additional 5% Raw material
64.4 %	14.9 kg	3.2 %

5.2. Sensitivity

When the brightness of On-mode, which may vary as data, is maximized, it will increase by 21 W in actual measurement.

When On-mode increases by 21 W, Total Power Consumption increases from 252.9 kWh to 557.1 kWh. This corresponds to an increase of 187.8 kg in CO2 emissions. In the GWP impact, Total Power Consumption (use phase) accounts for 33.7 % of the total, so the total GWP impact increases by 40.6 %.

Use phase impact of GWP	CO2 emissions increased by maximizing on-mode brightness	Impact to GWP by increase maximizing on-mode brightness
33.7 %	187.8 kg	40.6 %

5.3. Consistency

The impact index of the LCD panel accounts for 68.0 % of the raw material, and 43.8 % of the total life cycle impact index. If the impact index of the LCD panel increases by 10% due to errors, the total impact will increase by 4.4 %. This corresponds to an increase of 20.3 kg in CO2 emissions.

UNIT-LCD impact of GWP	CO2 increased amount by increase UNIT-LCD impact	Impact to GWP by increase UNIT-LCD impact
43.8 %	20.3 kg	4.4 %

5.4. Representativeness

The materials and processes of this product are very common. So, most of selected data represents this model well. However, there are several kinds of cables/connectors in this product and we used only the below three data. These cables/connectors consist of 3.7% total product weight. This might have some small variances.

- Cable, three-conductor cable
- Electric connector, wire clamp
- Electric connector, peripheral type buss

There is a stand-free version as another form of EV3240X. In the case of the version without stand, the impact index for the no stand is reduced.
From the GWP impact, CO2 emissions from the stand are 5.5 % of the raw material, which is 16.5 kg. The total impact without a stand is only decrease of 4.1 %, and it can be considered that the standard product with stand can be regarded as representative data.

ASSY-STAND and ASSY-BASE-UNIT impact of GWP	CO2 decreased amount by no stand impact	Impact to GWP by decrease stand
5.5 %	-16.5 kg	-4.1 %

5.5. Conclusion

It was found that the ratio of the power consumption by the user to the global warming potential (GWP) is as large as 33.7 %. The power consumption of the display by the user greatly changes depending on the actual daily usage and the brightness setting of the display. We realized again that the need to reduce power when using the display.

5.6. Recommendation

Since the global warming potential (GWP) can be reduced by reducing the power consumption of the user, it is necessary to appropriately control the brightness when using the display, which greatly affects the power, or to reduce the power consumption of the display itself.

6. References

- ISO 14025/DIN EN /ISO 14025:201110: Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- ISO 14040: 2006 - Environmental management – Life cycle assessment – Principles and framework
- ISO 14044:2006 - Environmental management – Life cycle assessment – Requirements and guidelines
- EPD 004: Monitor [2013/00/201309], Product Category Rules (PCR) for Monitor
- SimaPro 9.0 / Ecoinvent 3:
- CML 2001 (all impact categories) V2.05 / the Netherlands, 1997