Life Cycle Assessment for Galaxy Tab Active4 Pro

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its products. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal phase. To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used SimaPro 9.3.0.3 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories including; Product bill of material(BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to attain the highest level of accuracy. The outcome of the LCA confirmed and quantified 10 potential environment impact categories including; global warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed for each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the environmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 3.8
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2 baseline 2000 V2.05 / the Netherlands, 1997 as provided in the SimaPro 9.3.0.3 LCA tool
LCA software	SimaPro 9.3.0.3

System boundary of LCA

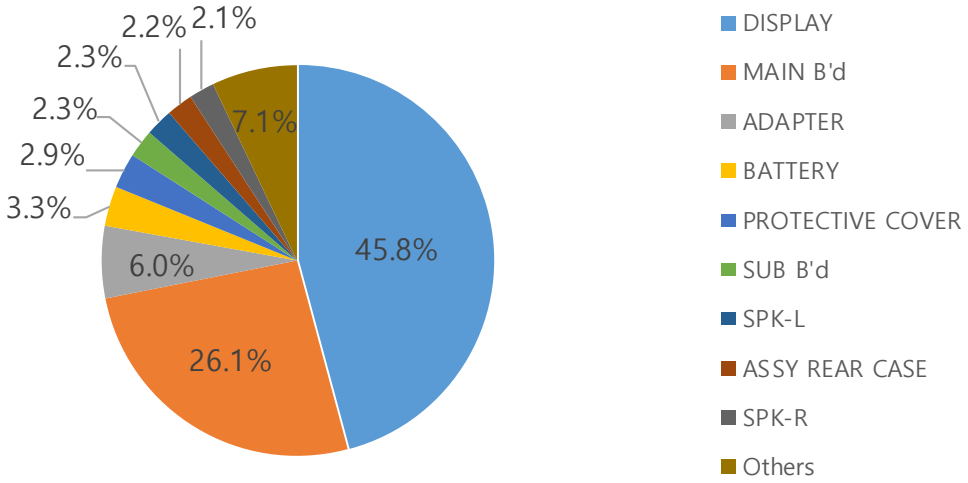
Pre-manufacturing	Parts and materials constituting the products and its transportation
Manufacturing	Product assembly by Samsung Electronics
Distribution	From Korea to United States
Use	3 years use
Disposal	Waste treatment of parts and material

Critical review for LCA study was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

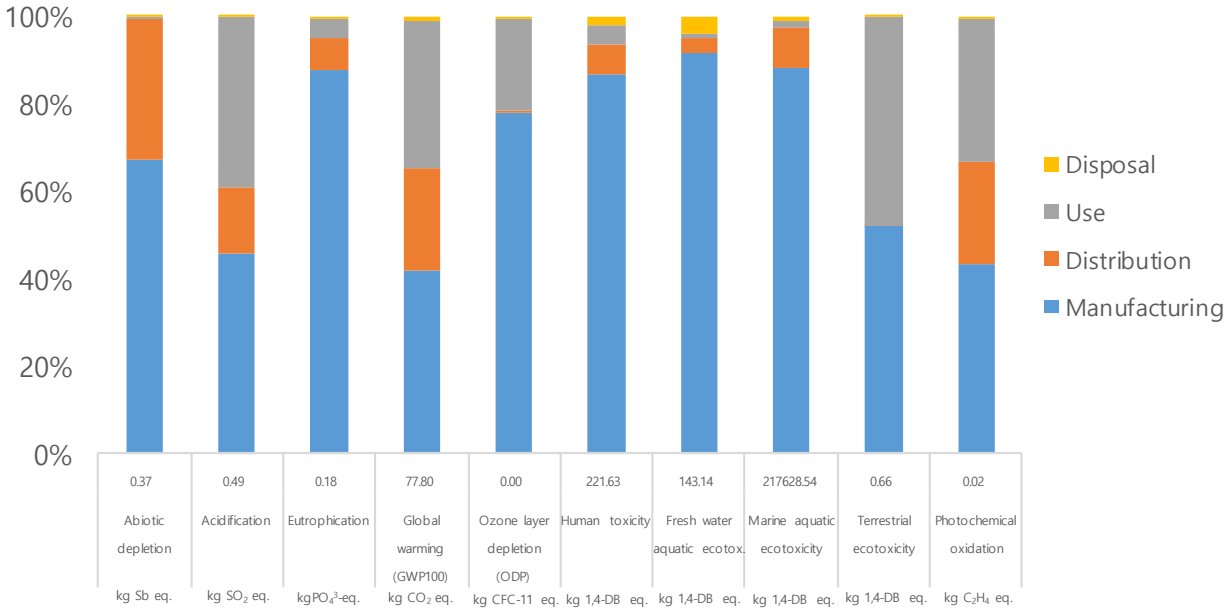
Product Features

Model name	Galaxy Tab Active4 Pro
Dimension	170.2 x 242.9 x 10.2 mm
Display	LCD 10.1”
Weight	Product&Acc. : 877.35 g Packages : 438.92 g

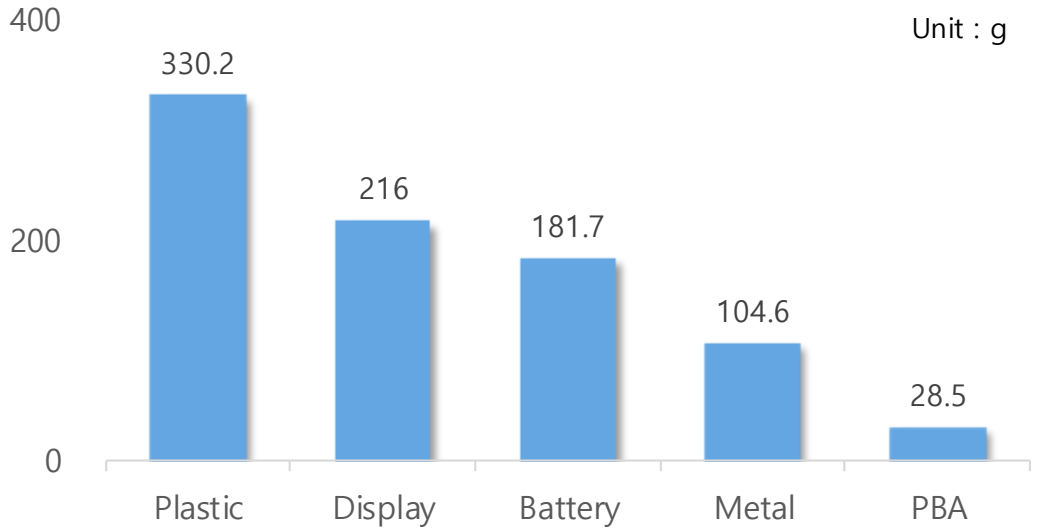
Global Warming Impact Profile



Characterized Environment Impact



Top 5 Substances of Target model



※ Calculated the Top 10 heaviest materials of the target model

Life Cycle Assessment for Galaxy Tab S6 Lite

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its products. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal phase. To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used SimaPro 9.3.0.3 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories including; Product bill of material(BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to attain the highest level of accuracy. The outcome of the LCA confirmed and quantified 10 potential environment impact categories including; global warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed for each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the environmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 3.8
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2 baseline 2000 V2.05 / the Netherlands, 1997 as provided in the SimaPro 9.3.0.3 LCA tool
LCA software	SimaPro 9.3.0.3

System boundary of LCA

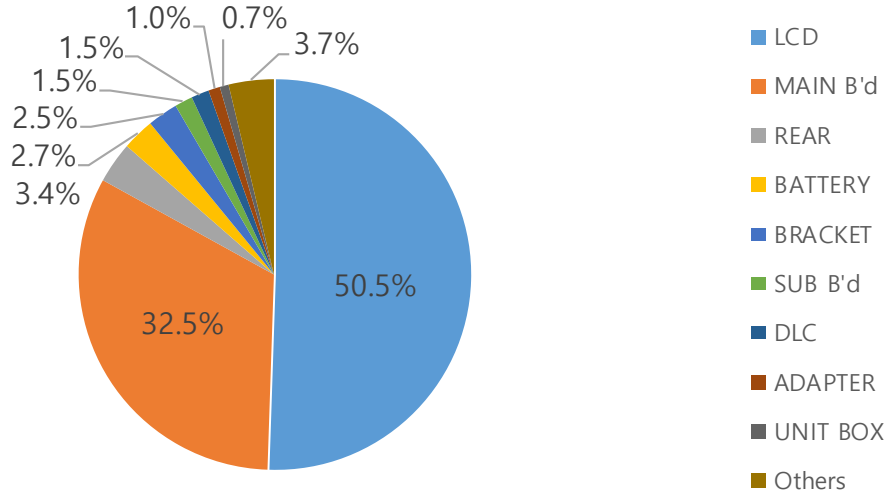
Pre-manufacturing	Parts and materials constituting the products and its transportation
Manufacturing	Product assembly by Samsung Electronics
Distribution	From Korea to EU
Use	3 years use
Disposal	Waste treatment of parts and material

Critical review for LCA study was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

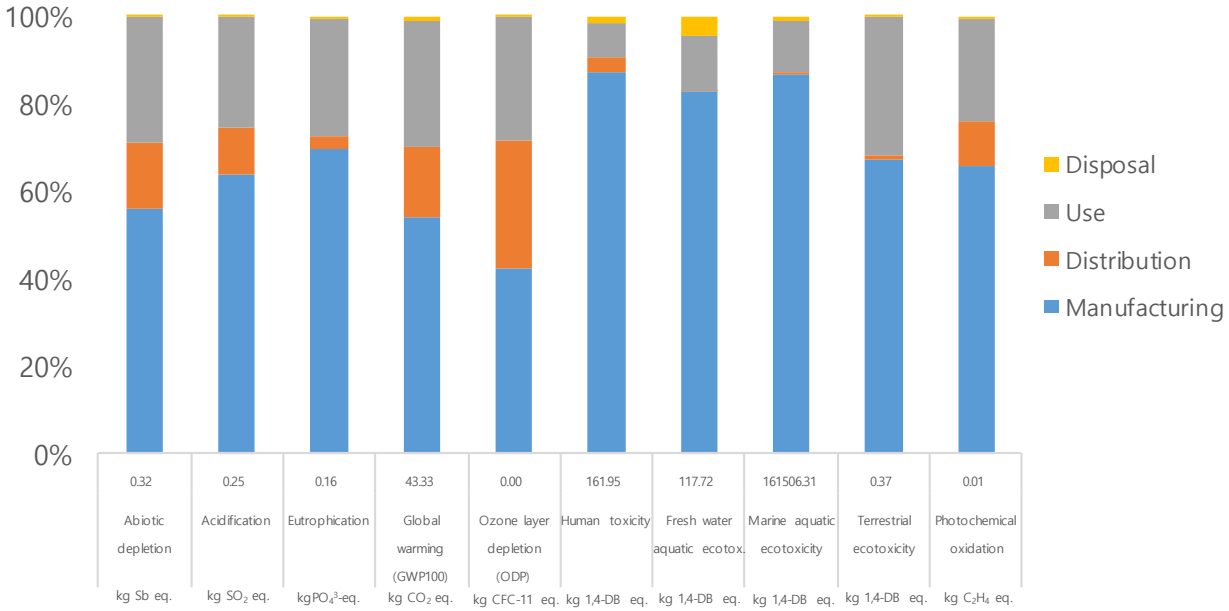
Product Features

Model name	Galaxy Tab S6 Lite
Dimension	244.5 x 154.3 x 7.0 mm
Display	10.4” LCD
Weight	Product & Acc. : 538.44g Packages : 246.81g

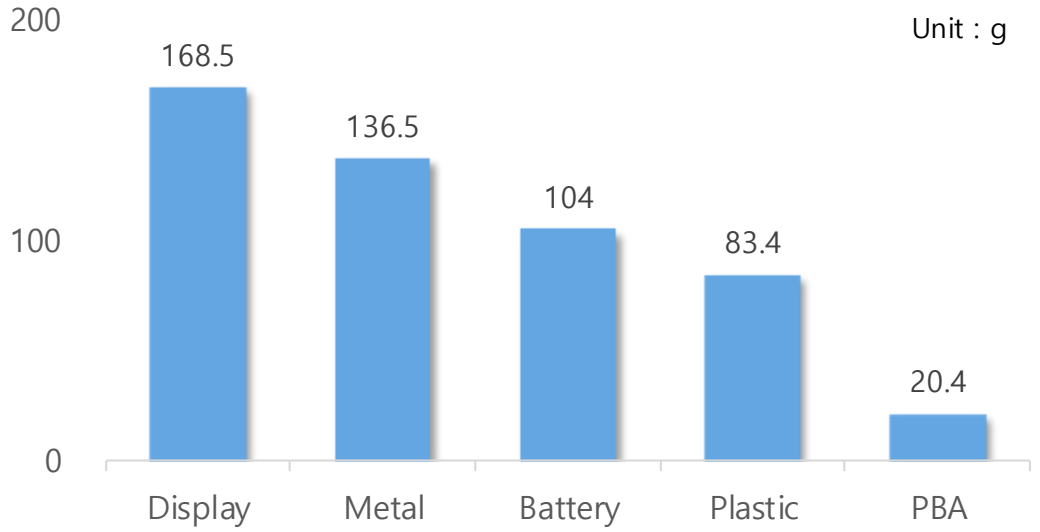
Global Warming Impact Profile



Characterized Environment Impact



Top 5 Substances of Target model



※ Calculated the Top 10 heaviest materials of the target model

Life Cycle Assessment for Galaxy Tab Active Pro

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its Tablets. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal phase. To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used SimaPro 9.1.1.1 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories including; Product bill of material(BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to attain the highest level of accuracy. The outcome of the LCA confirmed and quantified 10 potential environment impact categories including; global warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed for each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the environmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 3.6
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2 baseline 2000 V2.05 / the Netherlands, 1997 as provided in the SimaPro 9.1.1.1 LCA tool
LCA software	SimaPro 9.1.1.1

System boundary of LCA

Pre-manufacturing	Parts and materials constituting the products and its transportation
Manufacturing	Product assembly by Samsung Electronics
Distribution	From Korea to EU
Use	2 years use
Disposal	Waste treatment of parts and material

Critical review for LCA study was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

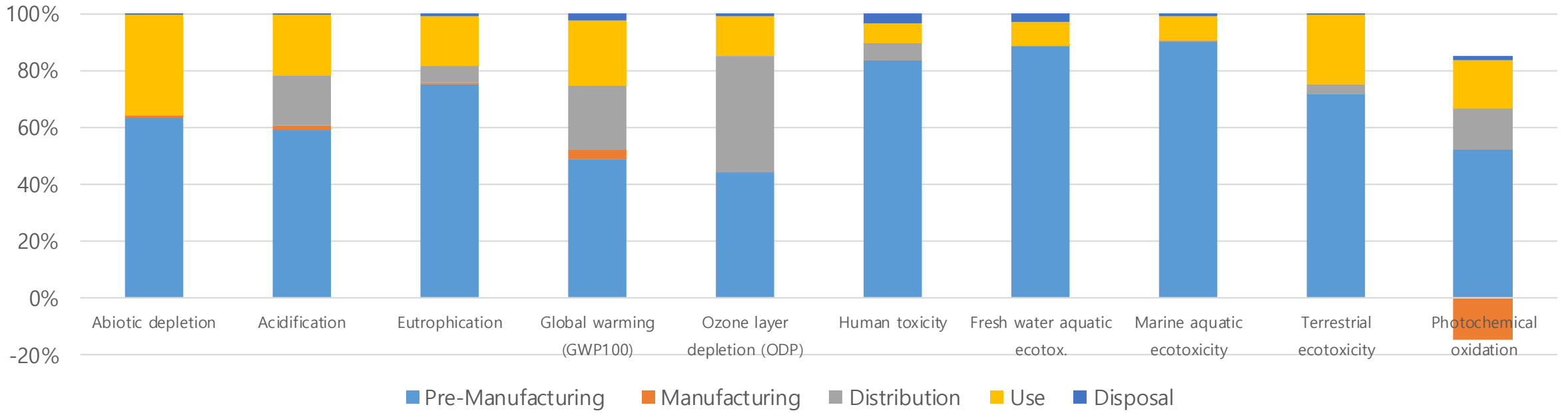
Product Features

Model name	SM-T545 (Galaxy Tab Active Pro)
Processor	Qualcomm, SDM670, 2GHz,1.7GHz Octa-Core 64bit
Dimension	170.2 * 243.5 * 9.9mm
Display	LCD, 10.1"
Memory	ROM 64GB, RAM 4GB
Battery	7400 mAh
Camera	Main : 13.0M pixel / Sub : 8.0M pixel
Weight	Product&Acc. : 948.94g / PKG : 520.43g

Numerical environmental impact

Impact category	Total	Unit	Pre-Manufacturing	Manufacturing	Distribution	Use	Disposal
Abiotic depletion	2.99E-01	kg Sb eq.	1.89E-01	1.97E-03	2.65E-05	1.07E-01	1.19E-03
Acidification	3.02E-01	kg SO_2 eq.	1.79E-01	4.09E-03	5.30E-02	6.48E-02	1.10E-03
Eutrophication	1.63E-01	kgPO_4^3-eq.	1.22E-01	1.08E-03	9.06E-03	2.86E-02	1.67E-03
Global warming (GWP100)	6.28E+01	kg CO_2 eq.	3.06E+01	2.23E+00	1.40E+01	1.46E+01	1.39E+00
Ozone layer depletion (ODP)	4.37E-06	kg CFC-11 eq.	1.93E-06	6.16E-11	1.78E-06	6.20E-07	4.23E-08
Human toxicity	1.86E+02	kg 1,4-DB eq.	1.56E+02	9.47E-05	1.13E+01	1.24E+01	6.71E+00
Fresh water aquatic ecotox.	1.22E+02	kg 1,4-DB eq.	1.08E+02	1.93E-04	9.94E-02	1.03E+01	3.36E+00
Marine aquatic ecotoxicity	1.71E+05	kg 1,4-DB eq.	1.54E+05	1.62E-01	9.80E+02	1.42E+04	1.84E+03
Terrestrial ecotoxicity	3.59E-01	kg 1,4-DB eq.	2.57E-01	5.90E-06	1.22E-02	8.85E-02	1.39E-03
Photochemical oxidation	1.08E-02	kg C_2H_4 eq.	8.01E-03	-2.28E-03	2.25E-03	2.57E-03	2.86E-04

Characterized Environment Impact



Life Cycle Assessment for Galaxy Tab S7+

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its Tablets. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal phase. To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used SimaPro 9.1.1.1 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories including; Product bill of material(BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to attain the highest level of accuracy. The outcome of the LCA confirmed and quantified 10 potential environment impact categories including; global warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed for each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the environmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 3.6
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2 baseline 2000 V2.05 / the Netherlands, 1997 as provided in the SimaPro 9.1.1.1 LCA tool
LCA software	SimaPro 9.1.1.1

System boundary of LCA

Pre-manufacturing	Parts and materials constituting the products and its transportation
Manufacturing	Product assembly by Samsung Electronics
Distribution	From Korea to EU
Use	2 years use
Disposal	Waste treatment of parts and material

Critical review for LCA study was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

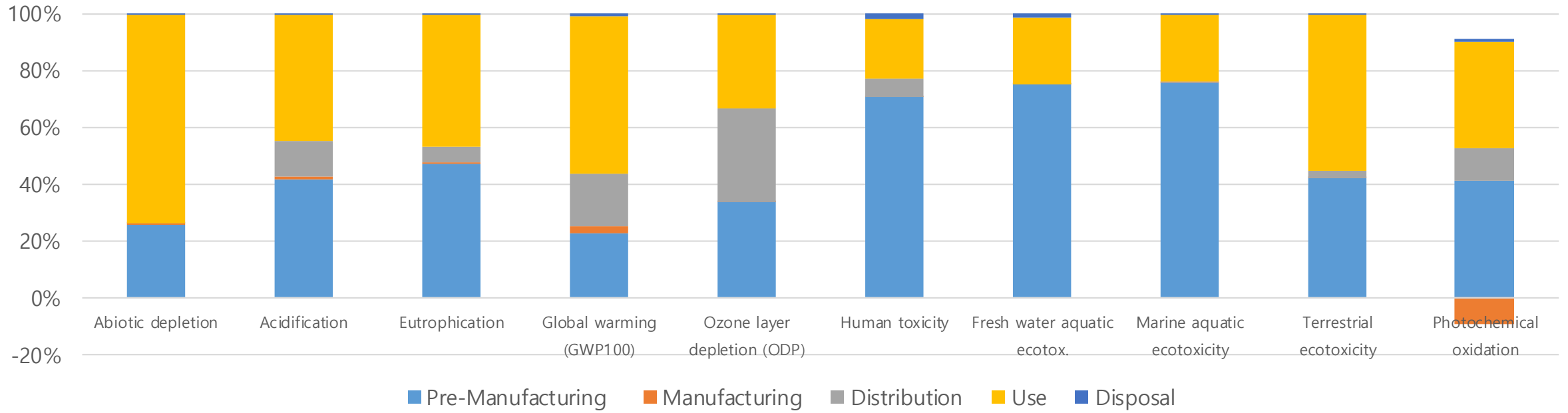
Product Features

Model name	SM-T976B (Galaxy Tab S7+)
Processor	Qualcomm, SM8250 Pro, 3.09GHz, 2.4GHz,1.8GHz Octa-Core 64bit
Dimension	185.0 × 285.0 × 5.7mm
Display	AMOLED 12.4”
Memory	ROM 128GB, RAM 6GB
Battery	9800 mAh
Camera	Main : 13.0M pixel / Sub : 8.0M pixel
Weight	Product&Acc. : 644.83g / PKG : 301.80g

Numerical environmental impact

Impact category	Total	Unit	Pre-Manu facturing	Manu facturing	Distribution	Use	Disposal
Abiotic depletion	2.81E-01	kg Sb eq.	7.22E-02	1.05E-03	1.80E-05	2.06E-01	1.22E-03
Acidification	2.83E-01	kg SO2 eq.	1.18E-01	2.17E-03	3.61E-02	1.25E-01	1.09E-03
Eutrophication	1.19E-01	kgPO43-eq.	5.65E-02	5.72E-04	6.17E-03	5.53E-02	8.61E-04
Global warming (GWP100)	5.12E+01	kg CO2 eq.	1.17E+01	1.18E+00	9.49E+00	2.83E+01	5.44E-01
Ozone layer depletion (ODP)	3.66E-06	kg CFC-11 eq.	1.23E-06	3.27E-11	1.21E-06	1.20E-06	2.23E-08
Human toxicity	1.14E+02	kg 1,4-DB eq.	8.05E+01	5.03E-05	7.66E+00	2.39E+01	2.16E+00
Fresh water aquatic ecotox.	8.55E+01	kg 1,4-DB eq.	6.43E+01	1.03E-04	6.76E-02	2.00E+01	1.11E+00
Marine aquatic ecotoxicity	1.18E+05	kg 1,4-DB eq.	8.90E+04	8.60E-02	6.67E+02	2.74E+04	7.06E+02
Terrestrial ecotoxicity	3.12E-01	kg 1,4-DB eq.	1.31E-01	3.13E-06	8.27E-03	1.71E-01	1.23E-03
Photochemical oxidation	1.10E-02	kg C2H4 eq.	5.54E-03	-1.21E-03	1.53E-03	4.97E-03	1.48E-04

Characterized Environment Impact



Life Cycle Assessment for Galaxy Tab S7

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its Tablets. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal phase. To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used SimaPro 9.1.1.1 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories including; Product bill of material(BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to attain the highest level of accuracy. The outcome of the LCA confirmed and quantified 10 potential environment impact categories including; global warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed for each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the environmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 3.6
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2 baseline 2000 V2.05 / the Netherlands, 1997 as provided in the SimaPro 9.1.1.1 LCA tool
LCA software	SimaPro 9.1.1.1

System boundary of LCA

Pre-manufacturing	Parts and materials constituting the products and its transportation
Manufacturing	Product assembly by Samsung Electronics
Distribution	From Korea to EU
Use	2 years use
Disposal	Waste treatment of parts and material

Critical review for LCA study was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

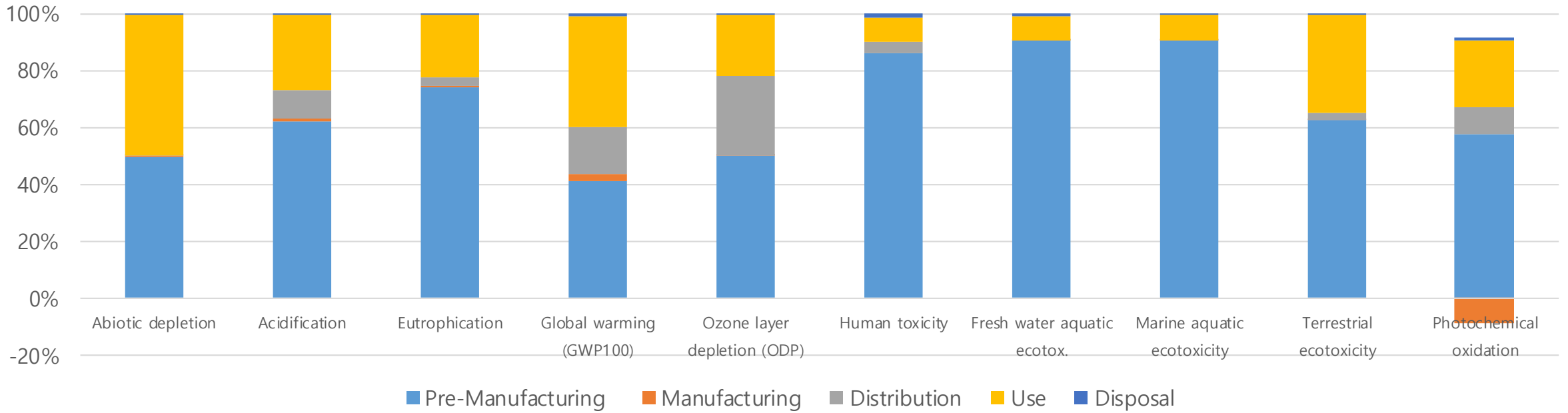
Product Features

Model name	SM-T875 (Galaxy Tab S7)
Processor	Qualcomm, SM8250 Pro, 3.09GHz, 2.4GHz,1.8GHz Octa-Core 64bit
Dimension	165.3 × 253.8 × 6.3mm
Display	In-Cell Touch LCD 10.95”
Memory	ROM 128GB, RAM 6GB
Battery	7760 mAh
Camera	Main : 13.0M pixel / Sub : 8.0M pixel
Weight	Product&Acc. : 574.49g / PKG : 270.26g

Numerical environmental impact

Impact category	Total	Unit	Pre-Manu facturing	Manu facturing	Distribution	Use	Disposal
Abiotic depletion	2.73E-01	kg Sb eq.	1.36E-01	1.05E-03	1.52E-05	1.35E-01	9.71E-04
Acidification	3.06E-01	kg SO2 eq.	1.90E-01	2.17E-03	3.05E-02	8.21E-02	8.80E-04
Eutrophication	1.65E-01	kgPO43-eq.	1.22E-01	5.72E-04	5.21E-03	3.62E-02	8.17E-04
Global warming (GWP100)	4.82E+01	kg CO2 eq.	1.99E+01	1.18E+00	8.02E+00	1.86E+01	5.34E-01
Ozone layer depletion (ODP)	3.65E-06	kg CFC-11 eq.	1.82E-06	3.27E-11	1.02E-06	7.86E-07	1.97E-08
Human toxicity	1.76E+02	kg 1,4-DB eq.	1.52E+02	5.03E-05	6.47E+00	1.57E+01	2.18E+00
Fresh water aquatic ecotox.	1.53E+02	kg 1,4-DB eq.	1.39E+02	1.03E-04	5.71E-02	1.31E+01	1.18E+00
Marine aquatic ecotoxicity	2.02E+05	kg 1,4-DB eq.	1.83E+05	8.60E-02	5.63E+02	1.79E+04	7.03E+02
Terrestrial ecotoxicity	3.23E-01	kg 1,4-DB eq.	2.03E-01	3.13E-06	6.99E-03	1.12E-01	1.03E-03
Photochemical oxidation	1.15E-02	kg C2H4 eq.	8.03E-03	-1.21E-03	1.29E-03	3.26E-03	1.34E-04

Characterized Environment Impact



Life Cycle Assessment for Mobile Products

Background

Samsung has developed strong technical experience in assessing the life cycle environmental impacts of its smart phones. The most recent life cycle assessment (LCA) has been for the Samsung Galaxy TAB E; Tab S2; Tab A 7.0; Galaxy Book model. The assessment considers potential environmental impacts across the whole life cycle including; pre-manufacturing; product manufacturing; distribution; product use; and disposal p hase.

To ensure technical quality; the analysis methodology has been completed according to international standard ISO 14040 series. Samsung has used Simapro7 software and a dedicated LCA S/W database to measure environmental impacts using a wide range of data categories includin g; Product bill of material (BOM), parts and components logistics, energy consumption in product use and end-of-life scenario data in order to at tain the highest level of accuracy. The outcome of the LCA confirmed and quantified 12 potential environment impact categories including; glob al warming; abiotic depletion; ocean acidification; eutrophication; and ozone layer depletion; where each impact category has been assessed fo r each life cycle stage. These LCA results will continue to be considered during product development phase as we aspire to improve the enviro nmental specifications of our products.

Calculation basis

Standard	ISO 14040:2006 and 14044:2006
Database	Ecoinvent 2.2
Method for impact assessment	Life cycle impact assessment classification and characterization factors according to CML 2001 as provided in the SimaPro 7.1.5 LCA tool
LCA software	SimaPro 7.1.5

System boundary of LCA

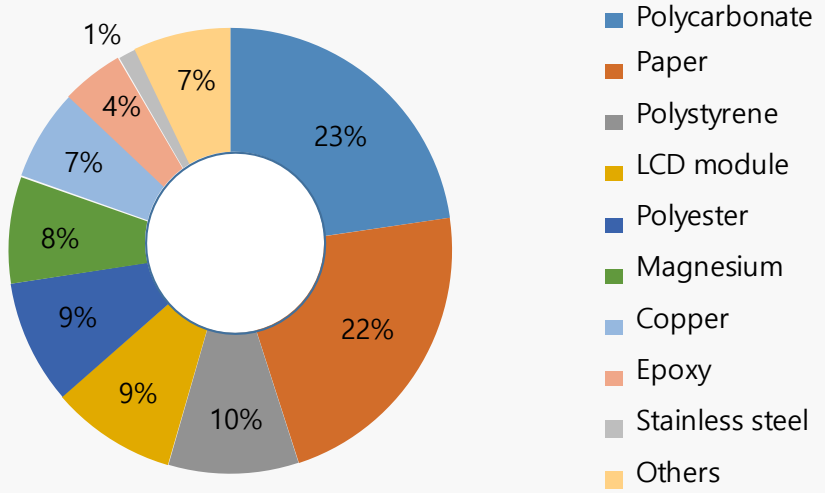
Pre-manufacturing	Parts and materials constituting the products and its transportation (from supplier to Samsung factory)
Manufacturing	Product assembly by Samsung Electronics (Data collection period : 3 months ahead of assessment)
Distribution	From China or Vietnam to United States
Usage	2 years use
Disposal	Waste treatment of parts and material

Critical review for Galaxy S6 LCA study was done by an expert from Korean Society for Life Cycle Assessment. (kslca@naver.com)
For the rest, it was done by internal expert in Global CS Center of Samsung Electronics. (ecodesign@samsung.com)

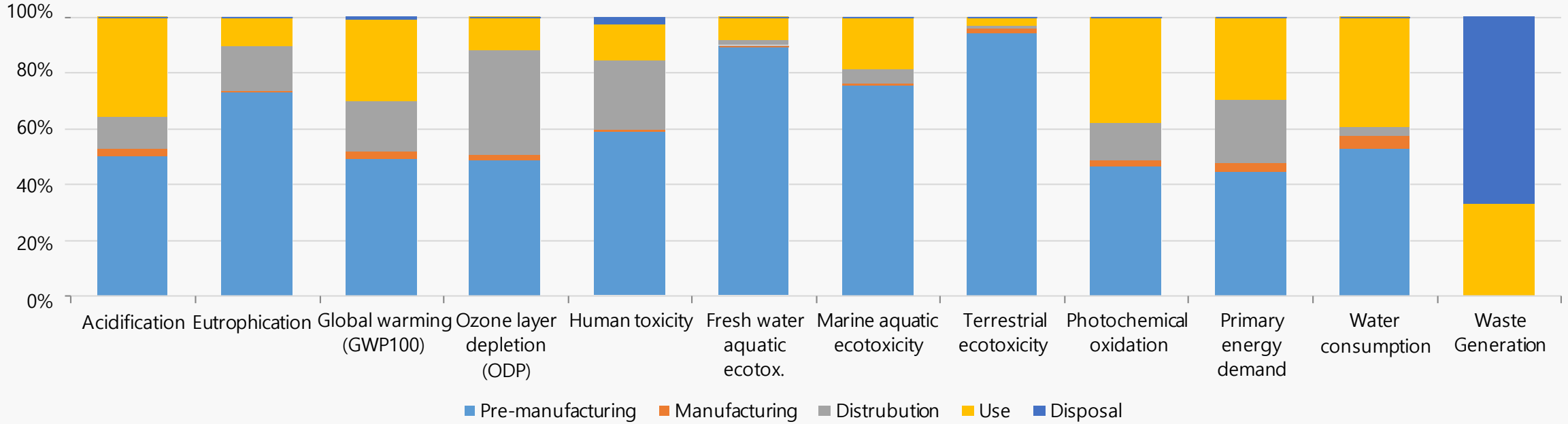
Product Features

Model name	SM-W727V (Galaxy Book)
Processor	Intel, Core i5, 3.1GHz Dual-Core 64bit
Dimension	199.8 x 291.3 x7.4(H*W*D)
Display	AMOLED, OCTA, SDC, 2160 x 1440 (FHD+) 12.0", 303.7mm 16M
Battery	Li-Ion 5070 mAh
Camera	13 MP / 5MP
Wt.(g)	1881.9g

Material Use



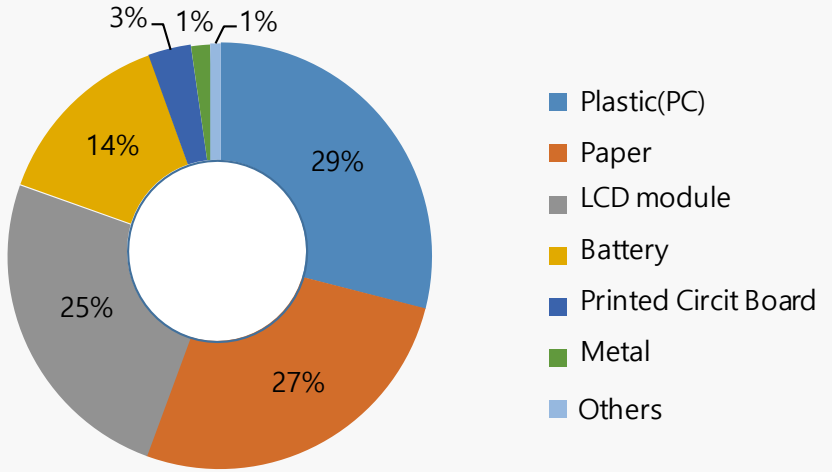
Characterized Environment Impact



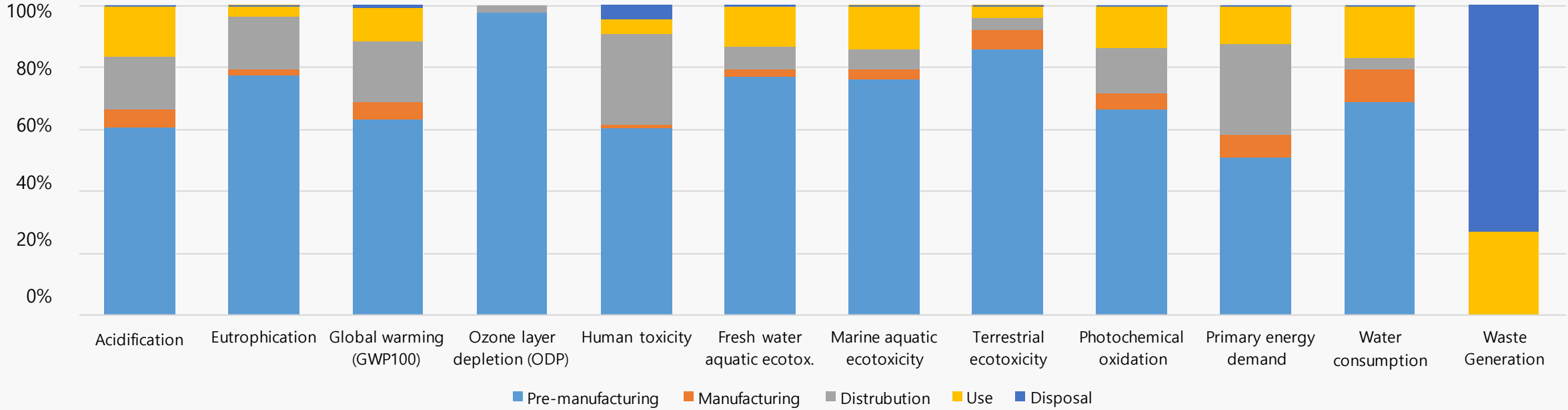
Product Features

Modelname	SM-T280 (Galaxy Tab A 7.0)
Processor	Quad-Core
Dimension	186.9 x 108.8 x 8.7 mm
Display	1280 x 800 (WXGA) TFT
Battery	Li-Ion 4000mAh
Camera	5.0 MP / 2.0 MP
Wt.(g)	283 g

Material Use



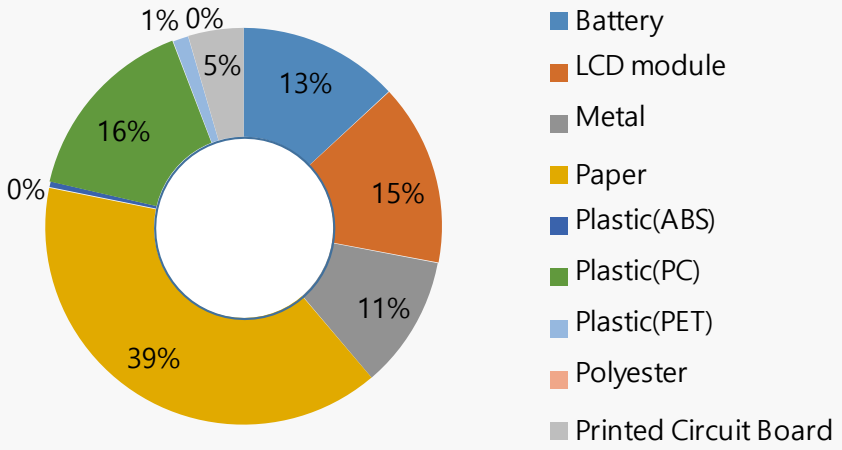
Characterized Environment Impact



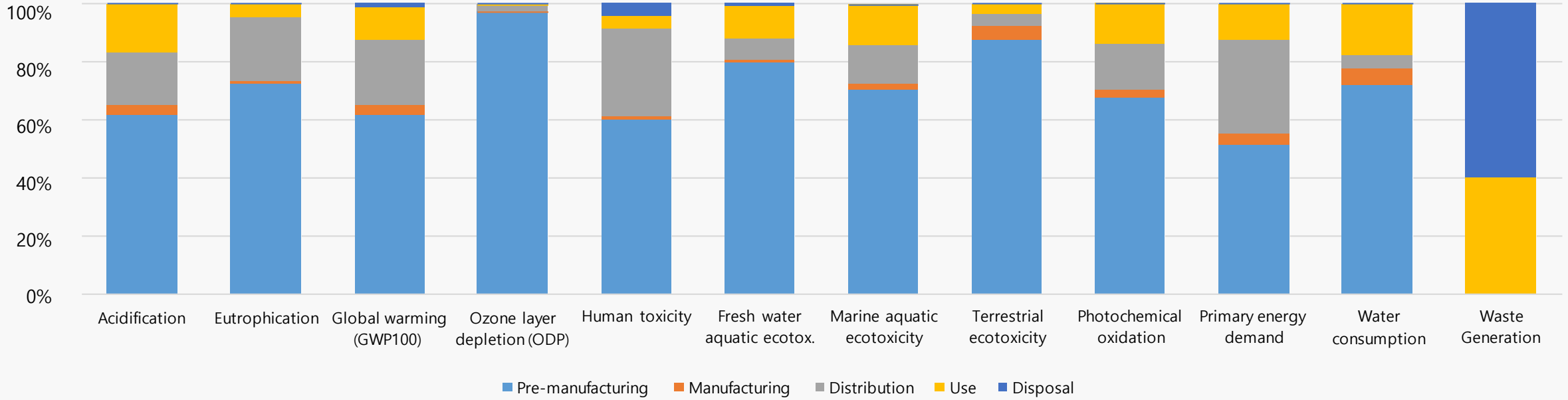
Product Features

Model name	SM-T817V (Galaxy Tab S2)
Processor	Octa-Core 1.9 GHz, 1.3 GHz
Dimension	237.3 x 169.0 x 5.6 mm
Display	AMOLED 10.1”
Battery	Li-Ion 5870mAh
Camera	8 MP / 2.1MP
Wt.(g)	379 g

Material Use



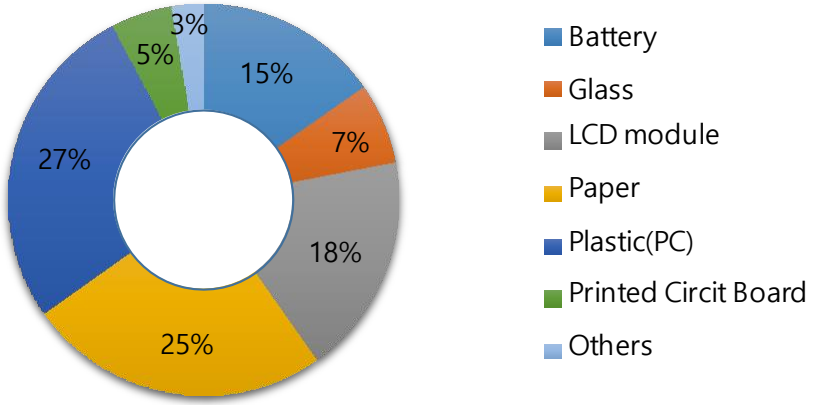
Characterized Environment Impact



Product Features

Model name	SM-T377P (Galaxy TAB E)
Processor	Quad-Core 1.2GHz
Dimension	212.1 x 126.0 x 8.9 mm
Display	TFT 8.0 ”
Memory	1.5GB RAM
Battery	5000mAh
Camera	Main : 5M pixel / Front : 2M pixel
Wt.(g)	Product : 192g / Packaging 259g

Material Use



Characterized Environment Impact