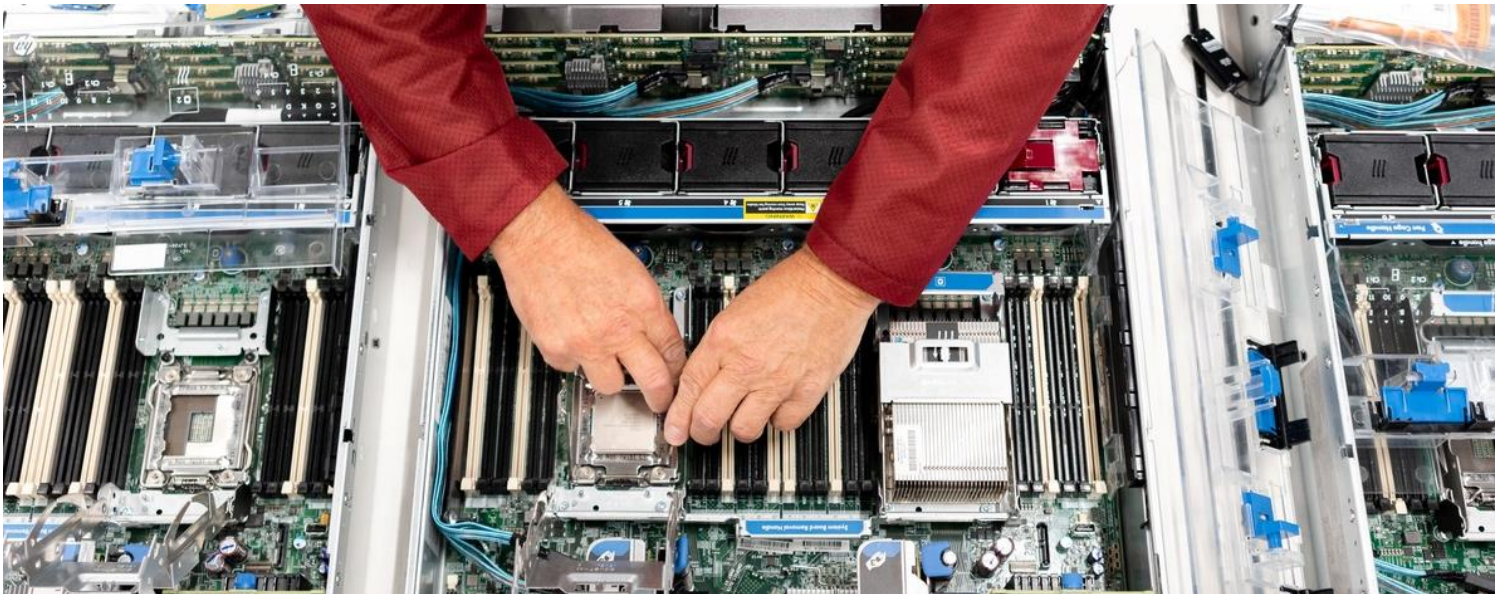




**Hewlett Packard
Enterprise**

Hewlett Packard Enterprise Server Product Recyclability Assessment



Hewlett Packard Enterprise utilized the International Electrotechnical Commission's (IEC) published standard 62635 Guidelines for End-of-Life Information Provided by Manufacturers and Recyclers and for Recyclability Rate Calculation of Electrical and Electronic Equipment 2012 as well as the NSF International Standard NSF/ANSI 426-2019 Environmental Leadership and Corporate Social Responsibility Assessment of Servers to measure the recyclability of HPE's products. This paper will show the methodology used by HPE to calculate product recyclability and the recycling methods

assumed.

Introduction

Hewlett Packard Enterprise (HPE) contributes to a circular economy by designing products that have long life spans, are easily repaired, upgradable, highly reused, and highly recyclable at the eventual end of their lives. This paper quantifies just how recyclable HPE's products are by utilizing the internationally accepted standard for calculating the recyclability of electronic products known as IEC 62635. This paper is required to be made publicly available to meet HPE's obligations for the Electronic Product Environmental Assessment Tool (EPEAT) server standard as defined in section 9.1.4 in NSF/ANSI 426 – 2019 **Environmental Leadership and Corporate Social Responsibility Assessment of Servers**. The EPEAT standard refers to IEC 62635, but deviates in how printed circuit boards are handled. Consequently, HPE uses IEC 62635 for all calculations aside from for printed circuit boards, for which HPE uses the method described by NSF/ANSI 426.

In order to meet the EPEAT requirements, HPE has completed recyclability assessments for products that represent each of HPE's major server product families. HPE uses a Recyclability Assessment Tool (RAT) that has been validated by a third-party recycler for accuracy. Although a high percentage of HPE products are typically recovered, repaired, and resold as used equipment, this methodology is focused exclusively on recyclability, therefore all products were assumed to have no components recoverable for reuse.

Measuring Recyclability

Recyclability can vary greatly depending on what materials products are made from, how they are collected at the end of their lives, how easily they can be disassembled, and what methods are used by the recycling facility that handles them. IEC 62635 works to address some of this variability by creating a common methodology for the recyclability rate calculation. IEC 62635 determines that there are generally four phases of product end-of-life (EoL) treatment: pre-treatment which involves separating parts to mitigate hazards (such as removing batteries); material separation which can be achieved in many ways including manual, mechanical (shredding), chemical, floatation, or thermal (smelting); energy recovery; and finally disposal.

The more recyclable a product is, the lower the proportion of it that should be sent for energy recovery or disposal. The recyclability rate of the product is thus the ratio of recyclable mass over the total mass of the product, resulting in a percentage as follows:

$$R_{\text{cyc}} = \frac{\text{Sum of recyclable masses of each parts}}{\text{Total product mass}} \times 100\%$$

HPE's End-of-Life Scenario

For the purpose of validating this methodology, HPE partnered with a recycler in Germany with whom HPE has had a long-standing relationship to analyze HPE products. IEC 62635 states that clear communication between manufacturers and recyclers is vital to achieving high recyclability rates. For the benefit of recyclers, HPE provides product disassembly instructions and information on parts that require special treatment such as batteries. This information is gathered and released as part of every new product introduction process, so recyclers have it long before a product should approach its EoL. The recycler provided HPE with information on their recycling process and methods, recovery rates, and the actual recyclability rates of products. Additionally, the recycler has helped HPE to understand the end-of-life monetary value of HPE products. The recycler did not check any products or components for reuse potential, as the focus was exclusively on the recyclability rate.



The recycler's process is to first engage in pre-treatment of all products to remove any hazardous components such as batteries. HPE does not use glue to attach batteries to products, so the recycler is able to remove them manually with commonly available tools. Batteries are sent to a specialized battery processing facility. The recycler then disassembles the products manually. This is eased by the fact that HPE products are either separable by hand or with common tools. As components of the servers are separated, they are sorted by material type. This results in higher recycling rates and a higher economic value for the recycler than using a mechanical shredder to separate out material types. It is assumed that other recyclers would choose to use a manual separation method as well, because of the higher economic returns reported.

Recyclability Results

Product printed circuit boards such as DIMMs, the mother board, storage controllers, expansion cards, and other circuit boards, as well as the products' processors are sent to a precious metals processor. The precious metals processor uses thermal sorting to extract valuable precious metals such as copper, gold, palladium, and platinum. These metals have very high economic values. For all product types, 100% of printed circuit boards can be recovered and sent for metals recycling at smelters. Thus, under EPEAT, the NSF/ANSI 426 standard considers this portion of the product to be 100% recyclable.¹

The majority of HPE's server products' weight is ferrous metal. Product chassis, hard drive trays, PCI expansion slots, risers, screws, and many more components are made from ferrous metal. Non-ferrous metals such as aluminum and copper are used inside hard drives, for heat sinks, and in cables. The recycler sends metals to a smelter which is able to recover all of these metals so that they may be used in place of virgin metals that are mined directly from the ground.

HPE products use relatively little plastic compared to many consumer electronic products. Plastic may be used in the air baffle (if present), fan housing, latches, and the insulation on cables. Most plastic components are easily separated manually aside from the plastic cable insulation.

Finally, the recycler found a very small volume of material that did not have post EoL value for recycling. An example of this material is foam used to form an air barrier between the fan mount and the chassis while reducing vibration. This material is sent to energy recovery rather than landfill.

EPEAT for Servers (NSF/ANSI 426-2019); Criterion 9.1.4 Results: HPE ProLiant DL325 Gen11 Recyclability Results

The ProLiant DL325 Gen 11 is a low cost highly configurable rack server that is representative of HPE's "DL" 1U 1P family of servers. The configuration used for this recyclability calculation included: one processor; twelve DIMM cards (RAM); the maximum seven fans; one hot-swappable power supply; eight hard disk drives; a drive controller; and two PCIe Riser Cards. Most of the product's weight is from the major metal components such as the chassis. This configuration weighed 13,466 grams, of which 12,932 can be recycled, so its recyclability rate is 96%.



$$R_{cyc} = 12,932g/13,466g \times 100\% = 96\%$$

¹ "Printed circuit board substrate material, included in printed circuit boards that will be sent to a smelter for metals recycling, shall be considered recyclable for the purpose of the calculation." NSF International Standard NSF/ANSI 426 – 2019 **Environmental Leadership and Corporate Social Responsibility Assessment of Servers**, Section 9.1.4.





Materials and Components	Weight (g)	% Weight	Recyclability Rate
Steel—Chassis, Brackets, Screws, etc.	6618	49.1%	100%
Aluminum, Copper –Heatsinks	750	5.6%	100%
PC/ABS Plastic - Brackets, Clips, etc.	129	<1%	100%
External Cable and Wires	490	3.6%	38%
Internal Wire and Cables	269	2%	38%
Batteries - Li-Ion batt module and button cell	130	<1%	100%
One Power Supplies	866	6.4%	90%
Seven Fans	312	2.3%	100%
Hard Disk Drives	1936	14.3%	98%
Motherboard	1214	9%	100%
Sub-assembly PCAs	442	3.3%	100%
RAM (32x)	300	2.2%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	13,466	12,932	96%

HPE ProLiant DL365 Gen 10 Plus Recyclability Results

The ProLiant DL365 Gen 10 Plus is a highly configurable rack server that is representative of HPE’s “DL” 1U 2P family of servers. The configuration used for this recyclability calculation included: two processors; thirty-two DIMM cards (RAM); the maximum seven fans; one hot-swappable power supplies; eight hard disk drives; a drive controller; and two PCIe Riser Cards. Most of the product’s weight is from the major metal components such as the chassis. This configuration weighed 17,563 grams, of which 17,127 can be recycled, so its recyclability rate is 97.5%.



$$R_{cyc} = 17,127g/17,563g \times 100\% = 97.5\%$$



Materials and Components	Weight (g)	% Weight	Recyclability Rate
Steel—Chassis, Brackets, Screws, etc.	9,432	53.7%	100%
Aluminum, Copper –Heatsinks	750	4.3%	100%
PC/ABS Plastic - Brackets, Clips, etc.	226.8	1.3%	100%
External Cable and Wires	490	2.8%	38%
Internal Wire and Cables	113.4	<1%	38%
Batteries - Li-Ion batt module and button cell	130	<1%	100%
One Power Supplies	866	4.9%	90%
Seven Fans	312.2	1.7%	100%
Hard Disk Drives	1,936	11%	98%
Motherboard	2,269	12.9%	100%
Sub-assembly PCAs	436	2.5%	100%
RAM (32x)	601.6	3.4%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	17,563	17,127	97.5%

HPE ProLiant DL385 Gen 10 Plus V2 Recyclability Results

The ProLiant DL385 Gen 10 Plus V2 is a highly configurable 2U rack server that is representative of HPE’s “DL” 2U 2P family of servers. The configuration used for this recyclability calculation included: two processors; thirty-two DIMM cards (RAM); the maximum six fans; two hot-swappable power supplies; eight hard disk drives; a drive controller; and two PCIe Riser Cards. Most of the product’s weight is from the major metal components such as the chassis. This configuration weighed 22,795 grams, of which 22,090 can be recycled, so its recyclability rate is 96.8%.



$$R_{cyc} = 22,090g/22,795g \times 100\% = 96.9\%$$



Materials and Components	Weight (g)	% Weight	Recyclability Rate
Steel—Chassis, Brackets, Screws, etc.	11820	51.9%	100%
Aluminum, Copper –Heatsinks	635.6	2.8%	100%
PC/ABS Plastic - Brackets, Clips, etc.	157.3	<1%	100%
PC Plastic - Air baffle	256	1.1%	100%
External Cable and Wires	490	2.1%	38%
Internal Wire and Cables	355	1.6%	38%
Batteries - Li-Ion batt module and button cell	130	<1%	100%
Two Power Supplies	1732	7.6%	90%
Six Fans	846	3.7%	100%
Hard Disk Drives	1936	8.5%	98%
Optical Disk Drive	163	<1%	78%
Motherboard	2413	10.6%	100%
Sub-assembly PCAs	1,060	4.7%	100%
RAM (32x)	800	3.5%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	22,795	22,090	96.9%

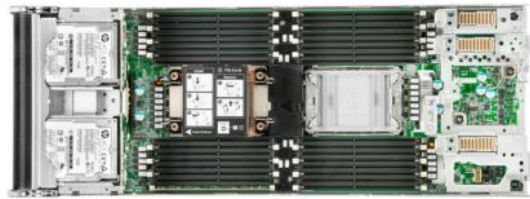
HPE Synergy 480 Gen10 Plus Recyclability Results

The Synergy 480 Gen10 Plus is a blade server that allows for converged data centers that is representative of HPE's "Synergy" family of blade servers. Blade servers share some infrastructure such as power supplies, cooling, and networking with other blades contained within the same enclosure (e.g., HPE Synergy 12000 Frame). This recyclability calculation is for the blade alone: power supplies, fans, the blade enclosure, and networking connections are not considered. This configuration does include two 2.5 inch hard disk drives. Steel and printed circuit boards account for a similar share of the Synergy 480 Gen10 Plus's weight, and together comprise nearly 80% of the total. The hard drives and heatsinks comprise much of the remainder. This blade server does not contain much plastic. This blade configuration weights 7,888 grams, of which 7,707 grams is recyclable resulting in a recyclability rate of 97.7%.





$$R_{cyc} = 7,707g / 7,888g \times 100\% = 97.7\%$$



Materials and Components	Weight (g)	% Weight	Recyclability Rate
Steel—Chassis, Brackets, Screws, etc.	3232	40.9%	100%
Aluminum, copper—Heatsinks	888	11.3%	100%
PC	192.7	2.4%	100%
PC/ABS	114.8	1.5%	100%
Internal Wires and Cables	16.8	<1%	38%
Batteries	89.3	1.1%	100%
Two Hard Disk Drives	1210	15.3%	98%
Motherboard and Processors	1950	24.7%	100%
RAM (8x)	150.4	1.9%	100%
Sub-assembly PCAs	44	<1%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	7,888	7,707	97.7%

HPE ProLiant ML350 Gen 10 Recyclability Results

The HPE ProLiant ML350 Gen10 server is designed for use in both enterprise data centers and as a tower server for small and medium sized businesses that is representative of HPE’s “ML” family of servers. It is a large unit offering a lot of customization and expandability. The configuration used for this recyclability assessment included two power supplies, four 3.5 inch hard disk drives, an optical disk drive, and three fans. A majority of the product’s weight is steel from the chassis, mounting brackets, drive cages, and so on. In total the product weights 33,691 grams, of which 33,057 grams are recyclable. The recyclability rate is 98.12%.





$$R_{cyc} = 33057g/33691 \times 100\% = 98.1$$



Materials and Components		Weight (g)	% Weight
Recyclability Rate			
Steel—Chassis, Brackets, Screws, etc.	23194.4	69%	100%
Aluminum, copper—Heatsinks	418.6	1%	100%
PC	1112	3%	100%
PC/ABS	571.15	2%	100%
LDPE	11.1	<1%	100%
Wire and Cables (Internal to System)	627	2%	38%
Button Cell Battery	131.2	<1%	100%
Motherboard and Processors	1486	4%	100%
RAM	264	<1%	100%
Other Printed Circuit Boards	132.85	<1%	100%
Optical Disk Drive	153	<1%	80%
Four 3.5 Inch HDDs	3188	9%	98%
Power Supplies	1510	4%	90%
Three Fans	892	3%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	33691	33057	98.1%



HPE Cray XD220v Recyclability Assessment

The Cray XD220v is a compute-intensive server node for HPE Cray XD 2000 systems that is representative of HPE’s “XD/XL” family of multi-node servers. Four of these half-width server nodes can fit in a standard 2U Cray XD 2000 chassis and each can be serviced without impacting the whole system. This recyclability assessment looks at only a single node, not the associated chassis. The configuration used for this assessment does not include power supplies or any drives. The majority of the node’s weight is from the steel tray, motherboard, and heatsinks. In total the node weights 6,746 grams of which 6,446 grams are recyclable resulting in a recyclability rate of 95.6%.



$$R_{cyc} = 6,446g / 6,746g \times 100\% = 95.6\%$$

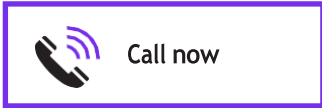
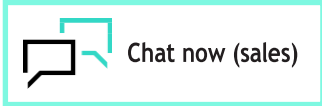


Materials and Components	Weight (g)	% Weight	Recyclability Rate
Steel—Chassis, Brackets, Screws, etc.	3136	46.5%	100%
Aluminum, copper—Heatsinks	888	13.2%	100%
PC/ABS Plastic	98	1.5%	100%
Non-recyclable Plastic	300	4.4%	0%
Internal Wire and Cables	64	<1%	38%
Button Cell Battery	3	<1%	100%
Four fans	440	6.5%	100%
Motherboard and Processors	1652	24.5%	100%
RAM (4x)	75.2	1.1%	100%
Sub-assembly PCAs	90	1.3%	100%
	Total Weight	Recyclable Weight	Recyclability Rate
	6,746	6,446	95.6%



Data sheet

Make the right purchase decision.
Contact our presales specialists.



[Get updates](#)



© Copyright 2023 Hewlett Packard Enterprise Development LP. The information contained herein is subject to change without notice. The only warranties for Hewlett Packard Enterprise products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. Hewlett Packard Enterprise shall not be liable for technical or editorial errors or omissions contained herein.

