Life Cycle Assessment of Dell Severs R6515 - R7515 - R6525 - R7525

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From design to end-of-life and everything in between, we work to improve the environmental impact of the products you purchase. As part of that process, we estimate the specific impacts throughout the lifecycle. The lifecycle phases included in a LCA are illustrated in figure 1.

LCA Definition

'A life cycle assessment is the compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle' – *ISO 14040: 2006, sec 3.2.*

Figure 1: 'Cradle to grave' Life Cycle Assessment phases

The products selected for this LCA are the Dell PowerEdge severs R6515, R7515, R6525, R7525. These severs represent general-purpose rack servers which provide computing services capable of handling very demanding workloads and applications, such as data warehouses, ecommerce, AI/Machine Learning, and high-performance computing (HPC). The server configuration modelled in this LCA represents that of a high-end configuration (table 1).

Table 1: Assumptions

Component	Assumptions R6515	R7515	R6525	R7525
Lifetime of product	4 Years			
Use location	EU & US			
Mainboard	12 layers, OSP fin-ishing		14 Layers	
Memory	8x Micron 16GB		16x Micron 16GB	
Hard Drives	2x 4TB SATA			
Processor	1x AMD EPYC 7452		2x AMD EPYC 7452	
Chassis	1U Rack Chassis with up to 4 x 3,5" Hard Drives for 1CPU configuration incl. rails and bezel	2U Rack Chassis with up to 8x3,5" Drives for 1 CPU Configuration incl. rails and bezel	1U Rack Chassis with up to 4x3,5" Drives for 2 CPU Configuration incl. rails and bezel	2U Rack Chassis with up to 8x3,5" Drives for 2CPU Con-figuration incl. rails and bezel

Results Summary

The impact assessment results within this study include but are not limited to; global warming potential (GWP), ozone layer depletion potential and eutrophication potential. The results discussed in this LCA focus on the GWP impact category as it is considered the most robust and widely used impact category. GWP is also referred to as "climate change" or the 'carbon footprint'. A detailed view of the carbon footprint is shown in Figure 1. The major fraction of the impact - across all severs - results from the use and manufacturing phase of the severs. Transportation and end of life has a minimal contribution to the overall impact of the servers.

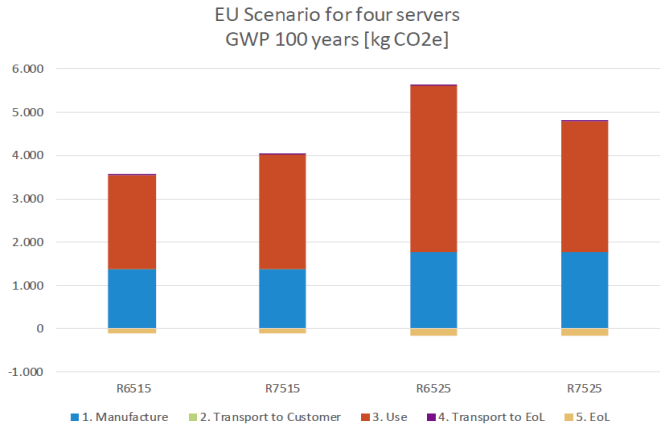

Figure 1: Contribution of the different stages of the lifecycle to the GWP of the severs (EU)

Dell PowerEdge R6515, R6525

Dell PowerEdge R7515, R7525

Key Findings:

- *Depending on the server model and its location of use, the use phase contributes between 64% and 71% to the total carbon footprint in the case of use in Europe and 71% to 77% in the case of used in the US.*
- *The share of greenhouse gas emissions from the manufacturing stage ranges from 28% to 39% (19% to 39% if the heavy use US scenario, which is not shown in detail, is considered) depending on the scenario and whether a light-medium or a heavy use scenario in the use stage is considered.*
- *Electronics contribute most to the part production impacts i.e., 96% to 97%, although these only account for 31% to 26% of the total mass of the products. SSDs contribute the most followed by memory bars.*
- *The SSDs dominate in terms of impact in manufacturing phase. They contribute between 48% and 62%, depending on the product.*
- *The majority of the SSD impact of the 4TB SSDs comes from the NAND flash chips. Results indicate that the die/package ratio of these chips significantly influences the GWP.*
- *After the SSDs, the main contributor to the part production impacts is the memory bars, which account with 19% to 30% of the total impacts. For the memory bars, the impact of the semiconductors is dominant.*
- *Chassis is the highest non-electronic component contributing to GWP in the manufacturing stage, with around 34 and 38 kg CO2-equivalents.*
- *Recycling resulted in a net reduction of approximately 105 and 172 kg CO2-equivalents depending on the product. This represents a reduction of the total impact by around 3%.*

Life Cycle Assessment of Dell PowerEdge R6515，R7515，R6525，R7525

The major impact for all severs is in the manufacturing and use phase. Transportation of each component to assembly location is included in the manufacturing stage and account for less than 1% of the overall across all servers. Figure 2 shows a breakdown of the manufacturing impact: electronic components, particularly SSDs (between 48% and 62% depending on the server) have the highest impact.

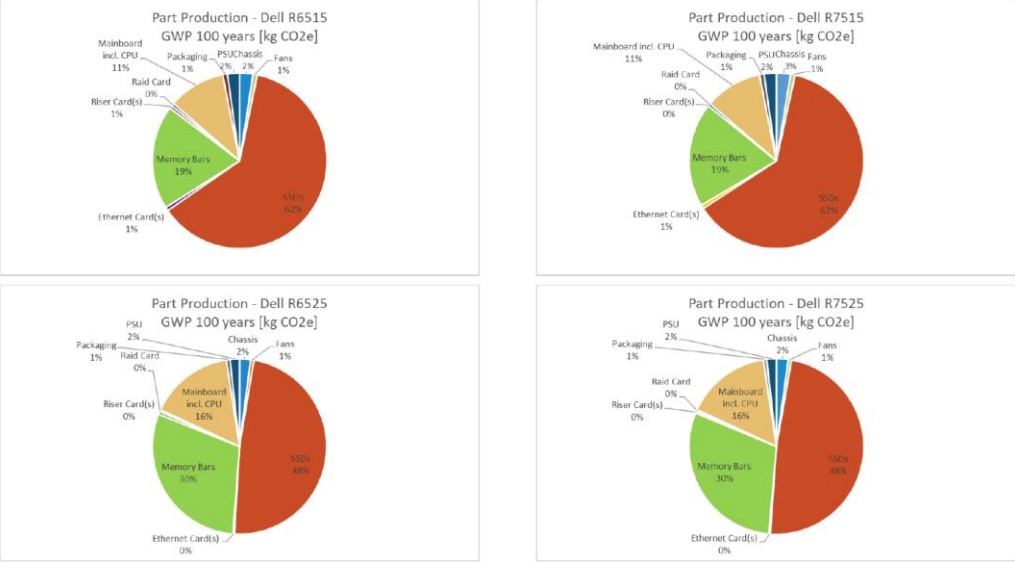

Figure 2: Contribution of the production of different modules to the GWP of the Dell Severs (EU)

Figure 3 details the impact of the SSD: the impact is coming from the NAND flash chips. The energy consumption, waste and emissions of their manufacture far outweigh the regular metallurgical or plastic production processes we see with other components such as the server chassis. This is especially the case for the associated complexity, high density and high capacity chips used in the SSD.

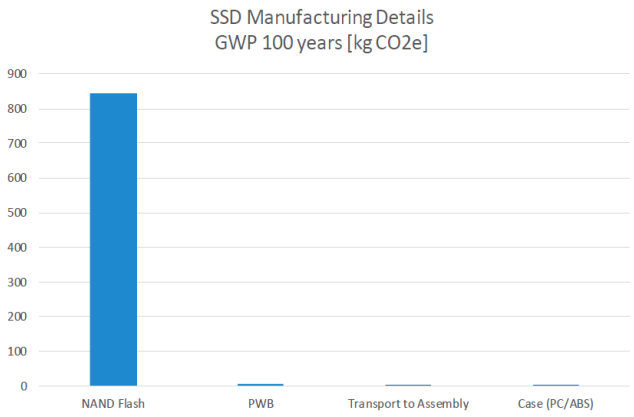

Figure 3: SSD Manufacturing Impact

How will Dell use the LCA Results?

The results obtained from the Dell Four Severs LCA will be used to:

- Determine environmental hotspots over the product's life cycle which can be used to support the development of environmentally sustainable products;
- Provide response to customer enquiries
- Support EPEAT registrations

Did you know?

R6515	One server has a footprint approx. equivalent to driving 8453 miles in a passenger car	10 of these servers… have a footprint approx. equal to what 40.6 acres of US forests can absorb in a year.	100 of these servers… have a footprint about the same as the annual average carbon footprint of 69 people.
R7515	One server… has a footprint approx. equivalent to driving 9604 miles in a passenger car	10 of these servers… have a footprint approx. equal to what 46.1 acres of US forests can absorb in a year.	100 of these servers… have a footprint about the same as the annual average carbon footprint of 78 people.
R6525	1 server… has a footprint approx. equivalent to driving 13,328 miles in a passenger car	10 of these servers… have a footprint approx. equal to what 64 acres of US forests can absorb in a year.	100 of these servers… have a footprint about the same as the annual average carbon footprint of 109 people.
R7525	One server… has a footprint approx. equivalent to driving 11,319 miles in a passenger car	10 of these servers… have a footprint approx. equal to what 54.4 acres of US forests can absorb in a year.	100 of these servers… have a footprint about the same as the annual average carbon footprint of 92 people.

Further Information

Full LCA

Zendesk

Progress Made Real – Our Vision for 2030

PAIA

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Calculations are based on the following methodologies: 2.45 miles driven per 1 kg co2e (source: U.S. EPA); approx. 850 kg co2e absorbed per acre of forests over a year (source: U.S. EPA); global personal carbon footprint estimated at 5 MTco2e per person (source: World Bank). Calculations are based on EU scenario.

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