Life Cycle Greenhouse Gas Assessment Summary Report

Kodak Alaris models E1025, E1035, S2040, S2050, S2060w, S2070, S2080w Scanners
ISO 14044 Protocol

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Summary

Kodak Alaris conducted an ISO 14044 Greenhouse Gas (GHG) Life Cycle assessment of seven Kodak Alaris desktop scanner models, E1025, E1035, S2040, S2050, S2060w, S2070, and S2080w. This included the full life cycle - raw materials, manufacturing, packaging, distribution, use, and end of life. These GHG assessments were undertaken to meet several objectives:

1. Identify the key drivers of GHG emissions from these scanners to provide data to use to reduce the life cycle GHG emissions of future versions of these and other scanner models.
2. Provide average scanner GHG emissions data for use by Kodak Alaris customers.
3. Meet the optional IEEE 1680.2 Imaging equipment EPEAT greenhouse gas emissions requirement in 4.5.2.1.
4. Provide the life cycle inventory data to the US National Renewable Energy Laboratory Life Cycle Assessment Database.

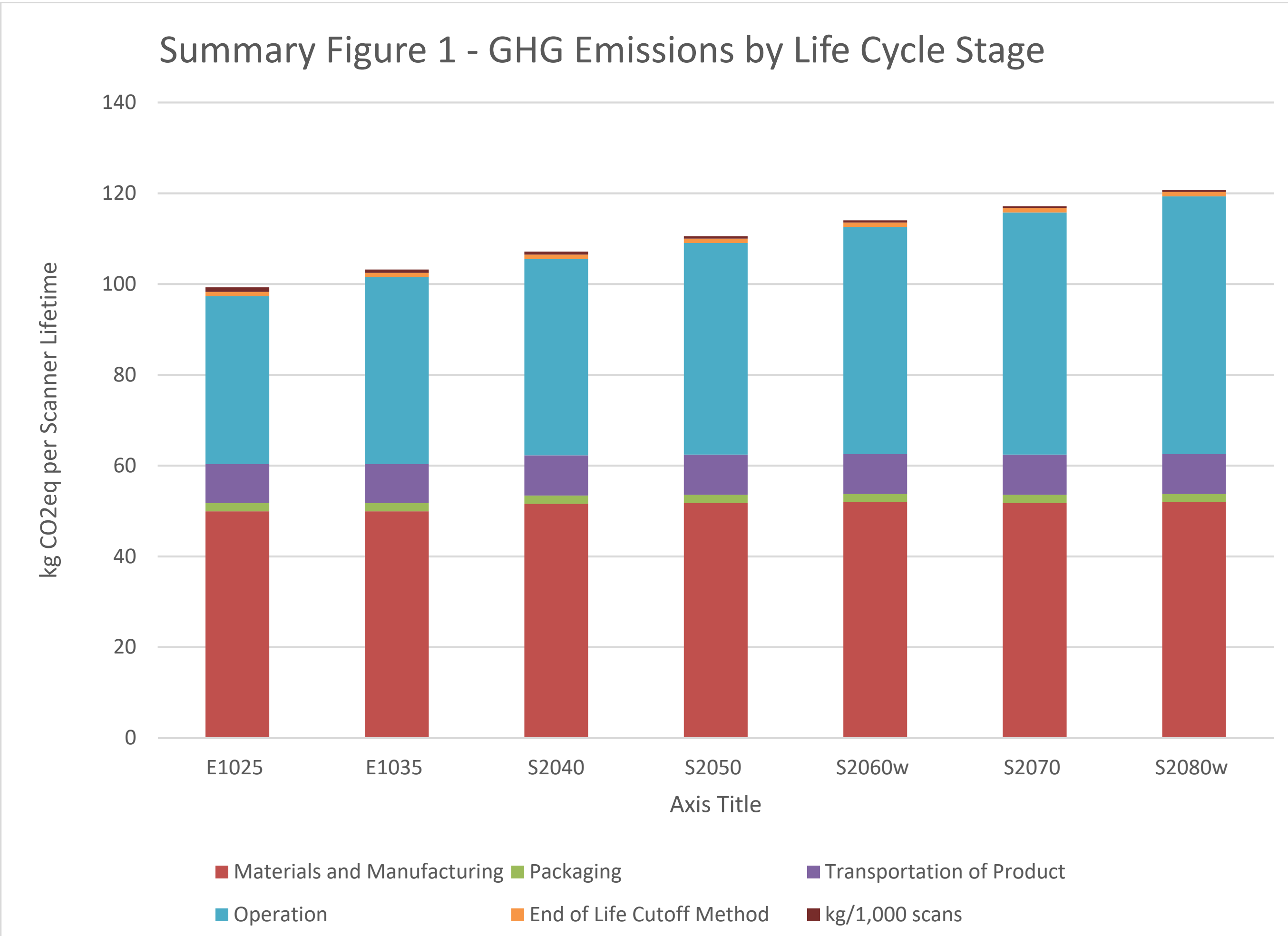
The GHG emissions calculations were based on IPCC 2013 GWP 100a Version 1.02 (100-year timeframe). The primary functional unit of this study was one scanner life, with a secondary functional unit of 1000 A4 scanned images. These two units are inter-convertible when combined with the user scenario as discussed in the Functional Units section.

Summary Table 1 contains the average GHG emissions results for the full life cycle using the base case of 3 years of useful life. Key GHG emitting life cycle stages for all models were operating energy during the use phase and the combined raw materials and manufacturing phase. As expected, total emissions increased as the model output increased, largely due to higher user energy consumption. However when expressed as GHG emissions per 1000 scans, the higher output the scanner the fewer GHG emissions per scan, making the higher output models more efficient per scan.

Summary Table 1 - Summary of Scanner GHG Emissions (kg CO2eq/scanner life) (IPCC 2013 GWP 100a V1.02)

Scanner Model	Scans/ Life	Materials and Mfg.	Packaging	Transportation of Product	Operation	End of Life Cutoff Method	Total	kg/ 1,000 scans
E1025	99,450	50	1.8	8.7	37	0.9	98	0.99
E1035	139,230	50	1.8	8.7	41	0.9	102	0.74
S2040	159,120	52	1.8	8.8	43	1.0	106	0.67
S2050	198,900	52	1.8	8.8	47	1.0	110	0.55
S2060w	238,680	52	1.8	8.9	50	1.0	114	0.48
S2070	278,460	52	1.8	8.8	53	1.0	117	0.42
S2080w	318,240	52	1.8	8.9	57	1.0	120	0.38

The total lifetime GHG emissions data from Table 1 is shown graphically and ordered by increasing scan rate in Summary Figure 1. Results are similar across all scanner models, except that use phase emissions increase as the scanner output increases.

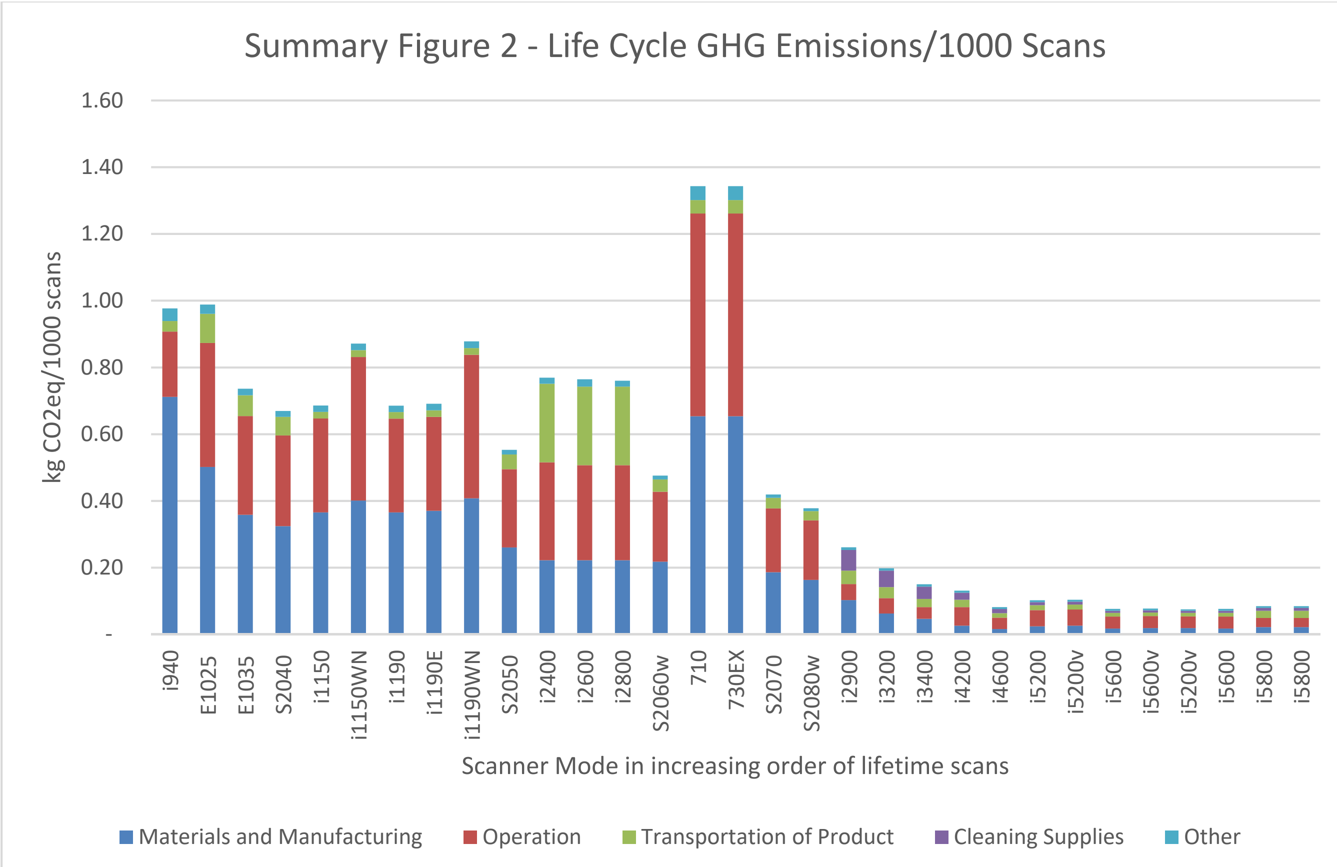


Summary Table 2 breaks down the GHG emissions further into the key sources of emissions. For the lowest output E1025 model, energy during sleep mode, energy during ready/idle mode, plastic components, and printed circuit boards all contribute between 15 and 21% of the total GHG emissions. Other significant contributors are manufacturing electricity, 9%, air transport, 7%, and metals, 4%, and 10% of the GHG emissions from other smaller sources. All other models have similar distributions except for the use phase. As model output increased the amount of GHG emissions from sleep phase dropped, while the quantity of GHG emissions from the ready idle mode increased. Ready/idle mode emissions increased as the model output increased, with the highest output model, S2080w, creating 2 ½ times the GHG emissions as the lowest output model, E1025. The sleep mode emissions dropped by about 80% from the E1025 to the S2080w model, since the S2080w only sleeps at the end of the workday before going into the off mode under the typical use scenario. Overall the higher output models had a higher use phase emissions (since ready/idle consumes 3 times as much power as sleep mode), slightly decreasing the percentage of total GHG emissions from other sources.

Summary Table 2 – Key Contributors to Life Cycle GHG Emissions – Percentage of Total Life Cycle

Scanner Model	Ready/Idle Energy	Sleep Energy	Plastics	Circuit Boards & Electronics	Electricity at Mfg. Plant	Ferrous Metals	Air Transport	Misc.
E1025	17%	16%	21%	15%	9%	4%	7%	10%
E1035	23%	13%	21%	15%	9%	4%	7%	7%
S2040	26%	11%	20%	14%	8%	4%	7%	9%
S2050	30%	9%	20%	14%	8%	4%	7%	9%
S2060w	34%	7%	19%	14%	8%	4%	6%	9%
S2070	38%	5%	20%	14%	8%	4%	7%	5%
S2080w	41%	3%	19%	14%	8%	4%	6%	5%

Summary Figure 2 displays the GHG emissions per 1000 scans for all the models in this study and all the models previously assessed during previous life cycle assessments. The models are arranged from the models with the fewest numbers of images scanned per lifetime to those with the most. The general trend was fewer emissions per scan as the number of scans increased. All the larger, high volume production scanners were much more efficient than the smaller volume scanners, largely due to fewer emissions per scan from materials and manufacturing and operating energy. The two E-series models fell about where expected on the chart. The five S-series models had lower emissions than would have been predicted for the output of the model based on the other previous models, indicating significant improvements in overall life cycle emissions per scan. This reduction occurred because S-series GHG emissions from materials and manufacturing and, to a lesser extent, energy use were lower than predicted from the previous models. Air transport GHG emissions from all S-series and E-series models was much lower than for the older i2000 series.



Key conclusions from this study are:

1. The use phase and manufacturing and materials combined phase contributed the majority of GHG emissions.

2. The majority of use phase GHG emissions were from sleep and the ready/idle modes. These emissions can be reduced by reducing the power consumption from these modes and going from the ready/idle mode to sleep faster and going from sleep to off faster.

3. Printed circuit boards and Teflon were the two types of materials that contributed key quantities of GHG emissions per pound of material and were significant overall contributors to GHG emissions, so reduction of these materials would have significant impact on GHG emissions.

4. Overall material use was a large contributor to GHG emissions, so any reduction in weight will also reduce GHG emissions.

5. Air transport continues to be a smaller overall contributor, but is still significant. Further substitution of ocean transport for air transport would further diminish the transport GHG emissions.

6. Significant reductions in GHGs/scan would be achieved by increasing the lifetime of these scanners. The ability to upgrade the technical capabilities of the scanners to keep them from becoming technologically obsolete would reduce the GHG emissions per scan from materials, manufacturing, packaging, transport and EOL.

7. The GHG emissions per scan for the lower output E-series scanners were in the same range as previous models with similar outputs. However the higher output S-series models and the S2040 model had lower emissions due to lower use phase emissions, lower emissions from materials, and lower air transport emissions.