Life Cycle Greenhouse Gas Assessment Summary Report

Kodak Alaris Document Scanner Models S2085f, S3060, S3100, S3100f, and S3120
ISO 14044 Protocol

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Summary

Kodak Alaris Holdings Limited (KA) conducted an ISO 14044 Greenhouse Gas (GHG) Life Cycle assessment of five KA desktop scanner models, S2085f, S3060, S3100, S3100f, and S3120. This included the full life cycle - raw materials, manufacturing, packaging, distribution, use, and end of life (EOL). These GHG assessments were undertaken to meet several objectives:

1. Identify the key drivers of GHG emissions from these scanners to provide data that can be used 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 (available via Federal LCA Commons).

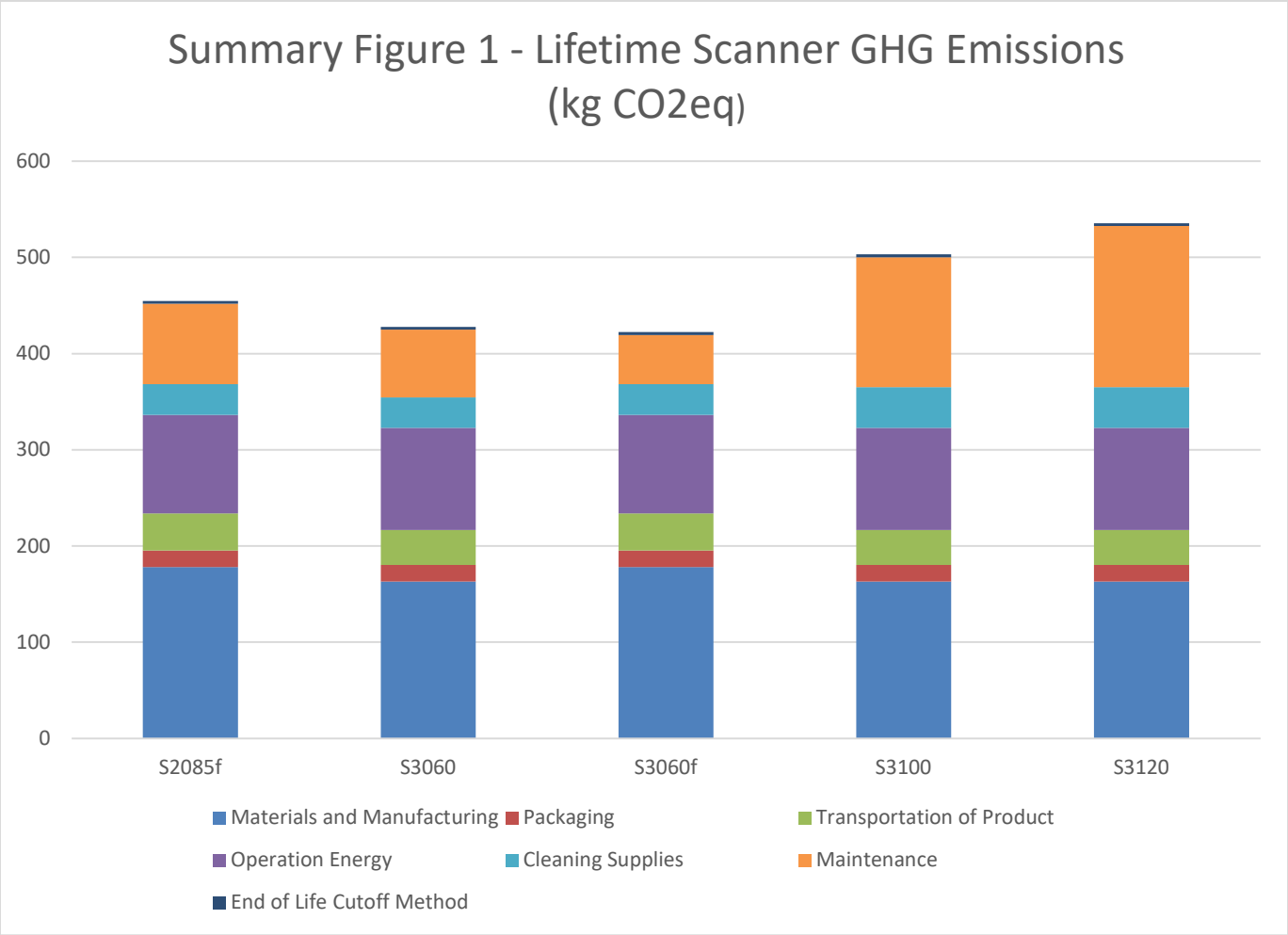
The GHG emissions calculations were based on IPCC 2013 GWP 100a Version 1.02 (100-year timeframe). The primary functional unit of this study was one scanner life, with a secondary functional unit of 1000 A4 scanned images. These two units are inter-convertible when combined with the user scenario as 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 a 3 year useful life. Key GHG emitting life cycle stages for all models were operating energy during the use phase, maintenance, and the combined raw materials and manufacturing phase. As expected, total emissions were higher for models with more lifetime scans, largely due to more maintenance (replacement rollers and tires). However when expressed as GHG emissions per 1000 scans, the higher output scanners had the fewer GHG emissions per scan, making the higher output models more efficient per scan.

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

Scanner Model	Scans/Life	Materials and Manufacturing	Packaging	Transportation of Product	Operation Energy	Cleaning Supplies	Maintenance	End of Life Cutoff Method	Total	kg/1,000 scans
S2085f	4,143,750	178	17	38	103	32	84	2.9	455	0.110
S3060	3,645,000	163	17	36	106	32	70	2.7	428	0.117
S3060f	2,925,000	178	17	38	103	32	51	2.9	422	0.144
S3100	6,075,000	163	17	36	106	42	135	2.8	503	0.083
S3120	7,290,000	163	17	36	106	42	168	2.8	535	0.073

The total lifetime GHG emissions data from Table 1 is shown graphically in Summary Figure 1.



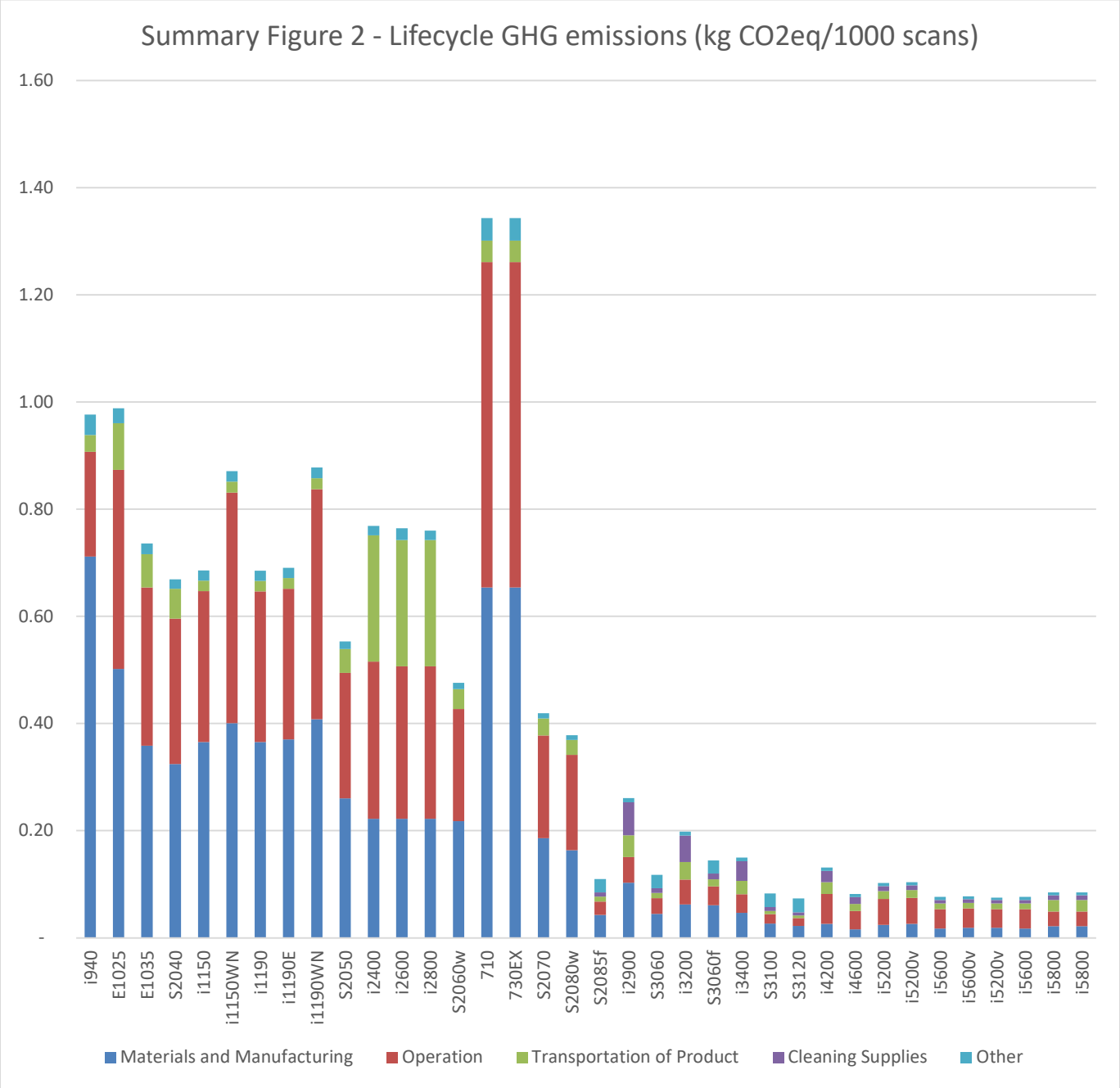
Summary Table 2 breaks down the GHG emissions into the key sources of emissions. Some categories overlap so they include the same emissions twice, while other GHG emissions were relatively small so they were not included in any category, resulting in totals that do not add to 100%. Total materials and components were the largest component of GHG emissions, comprising over 1/3 of the total. Total life cycle maintenance (replacement materials and components, packaging, and transport of these replacement parts) contributed almost 1/3 of the total GHG emissions for the higher scan rate models, but a little over 10% for the lowest scan rate model. Ready mode operating energy contributed 14 – 19% of the total life cycle GHG emissions (and about ¾ of the total operating energy GHG emissions.) Air transport of scanners and replacement rollers accounted for 11-14% of the total life cycle GHG emissions (and 80% of the transport emissions), even though only 10% of the product was shipped by air. Assembly plant electricity accounted for about 10% of the total life cycle GHG emissions, while printed circuit boards, packaging, and cleaning supplies each accounted for 5-8% of the total emissions. These eight categories are the areas where substantive GHG emissions reductions could occur. Potential reduction opportunities include reducing the overall material weight, reducing air transport of the scanners and replacement parts from the current rate 10% of the products to closer to zero,

reducing the power consumption in ready mode or reducing the time before going to sleep, increasing the life of the rollers and tires, and increasing the life of the scanner through the capability of upgrading the technology.

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

Scanner Model	Materials and components including replacement rollers	Printed Circuit Boards and Electronic Components	Assembly Plant Energy	Packaging, including of replacement rollers	Air Transport	Ready mode Operating Energy	Full life cycle maintenance	Cleaning Supplies	Life Cycle Total
S2085f	36%	5%	10%	7%	12%	17%	18%	7%	112%
S3060	34%	6%	10%	7%	12%	18%	16%	7%	110%
S3060f	35%	5%	11%	6%	11%	19%	12%	8%	106%
S3100	35%	5%	9%	7%	14%	15%	27%	8%	120%
S3120	36%	5%	8%	8%	15%	14%	31%	8%	125%

Summary Figure 2 displays the GHG emissions per 1000 scans for all the models in this study and all the models previously assessed during the previous four 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 is fewer emissions per scan as the number of scans increased. The newer S series models are more efficient (lower emissions per scan) than older similar output models. There were several key improvements to the S series models compared to the older I Series models which were designed for similar customers and throughput rates. There were significant reductions in energy consumption when sleeping and when off, but energized, so that these operating modes no longer contributed significantly to the overall GHG emissions. Air transport was reduced from about 30% of the scanners to about 10%. Air transport was largely replaced by ocean transport which produced less than 10% or the GHG emissions per scanner that air transport did. There was a significant reduction in the weight of materials that emit higher levels of GHG per kg, such as printed circuit boards. Overall, the S series models produced about 40% less GHG emissions than the similar older models.


Summary Figure 2 - Lifecycle GHG emissions (kg CO2eq/1000 scans)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
-
i940
E1025
E1035
S2040
i1150
i1150WN
i1190
i1190E
i1190WN
S2050
i2400
i2600
i2800
S2060w
710
730EX
S2070
S2080w
S2085f
i2900
S3060
i3200
S3060f
i3400
S3100
S3120
i4200
i4600
i5200
i5200v
i5600
i5600v
i5200v
i5600
i5800
i5800
Materials and Manufacturing
Operation
Transportation of Product
Cleaning Supplies
Other