Life Cycle Greenhouse Gas Assessment Summary Report*

Kodak Alaris models 710, 730EX, i940, i1150, i1150WN, i1190, i1190E, and i1190WN Scanners ISO 14044 Protocol

Roy Wood
Roy Wood Independent Engineer
Created for Kodak Alaris
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* Summary extracted from the full ISO 14044 report. Contact Kodak Alaris EHS for additional detail.

Summary

Kodak Alaris conducted an ISO 14044 Greenhouse Gas (GHG) Life Cycle assessment of eight Kodak Alaris desktop scanner models, 710, 730EX, i940, i1150, i1150WN, i1190, i1190E and i1190WN. This includes 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 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 National Renewable Energy Laboratory Life Cycle Assessment Database.

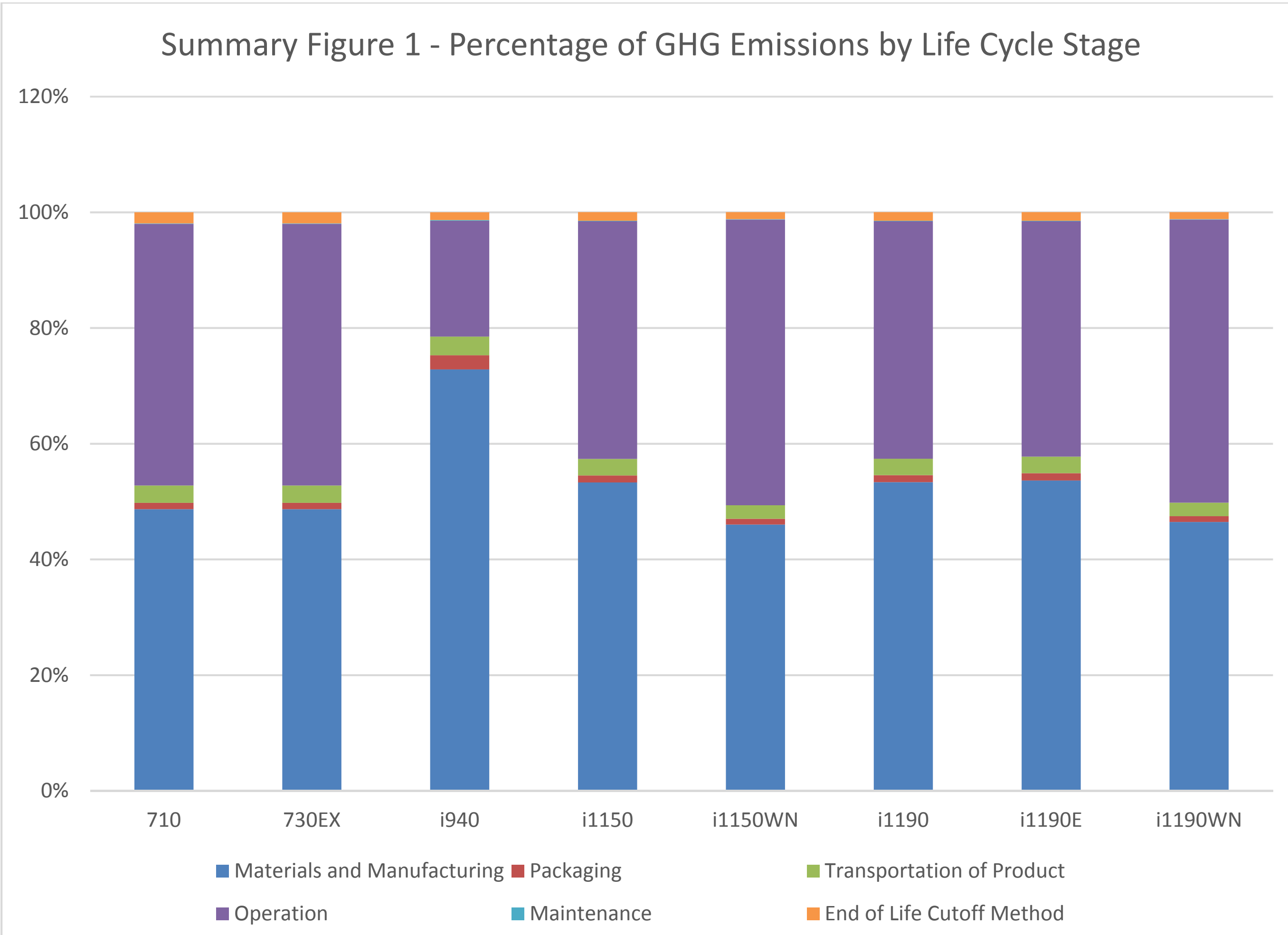
The GHG emissions calculations were based on IPCC 2013 GWP 100a Version 1.02 (100-year timeframe). The primary functional unit of this study was one scanner life, with a secondary functional unit of 1000 A4 scanned images. These units are inter-convertible when combined with the user scenario as discussed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

Summary Table 1 contains the 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 operations energy during the use phase and materials and manufacturing. As expected, total emissions were highest for the larger models, which scan more images over their lifetime. However even expressed as GHG emissions per 1000 scans, the i700 series scanners were the least efficient of the models evaluated. The i1100 non-wireless models had the lowest GHG emissions per scan. The wireless models have 27% higher emissions from operation than their non-wireless equivalent models.

Summary Table 1 - Summary of 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	Maintenance	Consumables	End of Life Cutoff Method	Total	kg/1,000 scans
710	238,680	156	3.5	9.6	145	0.23	0	6.2	321	1.34
730EX	238,680	156	3.5	9.6	145	0.23	0	6.2	321	1.34
i940	47,736	34	1.1	1.5	9	0.05	0	0.6	47	0.98
i1150	159,120	58	1.3	3.1	45	0.09	0	1.6	109	0.69
i1150WN	159,120	64	1.4	3.2	68	0.10	0	1.7	139	0.87
i1190	159,120	58	1.3	3.1	45	0.09	0	1.6	109	0.69
i1190E	159,120	59	1.4	3.2	45	0.09	0	1.6	110	0.69
i1190WN	159,120	65	1.4	3.3	68	0.10	0	1.7	140	0.88

The data from Table 1 is shown graphically in fractional form in Summary Figure 1. Results are similar across all scanner models, except the i940 has a greater fraction of emissions from manufacturing and materials and a smaller fraction from operations.

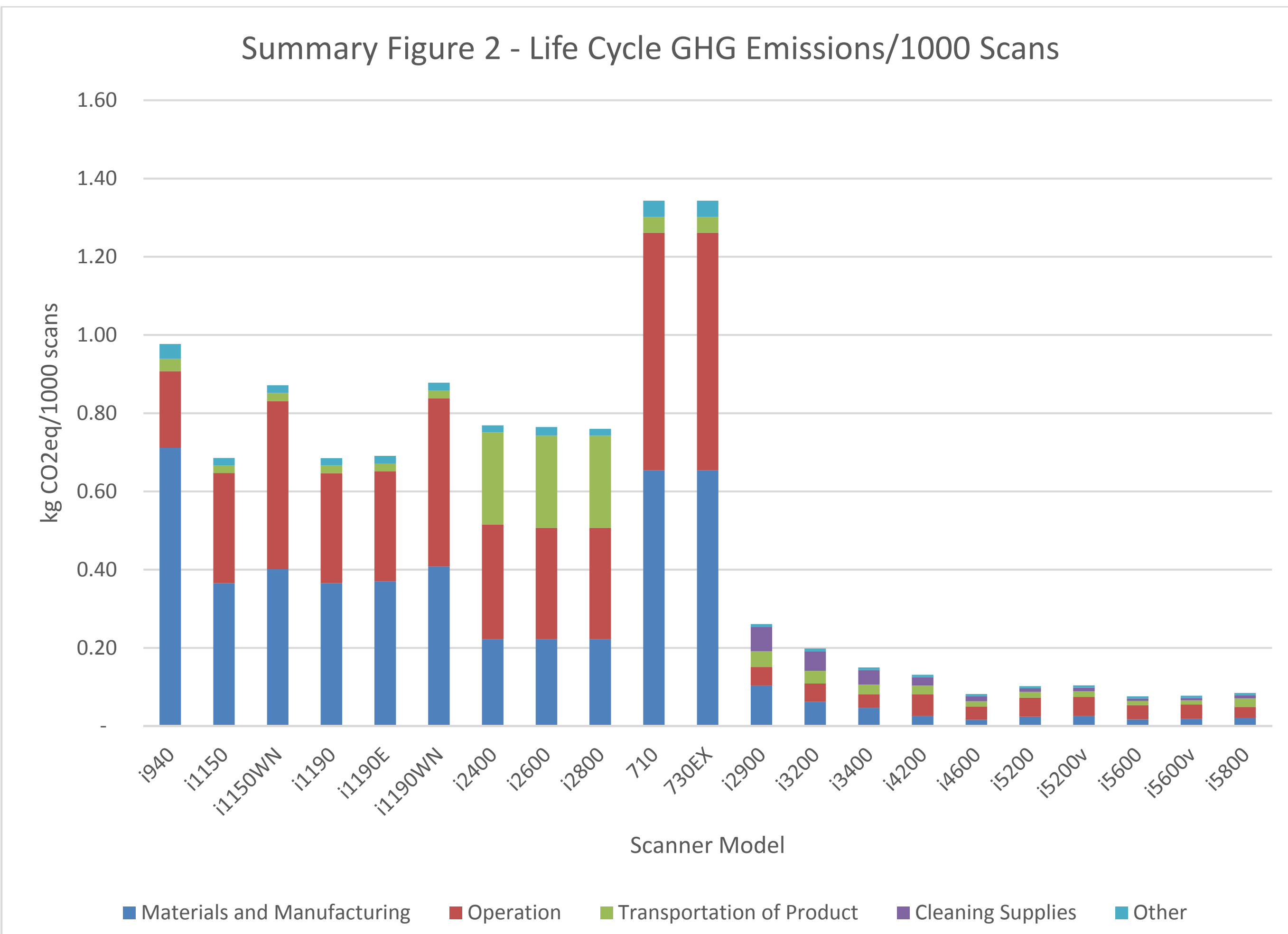


Summary Table 2 breaks down the GHG emissions further into the key sources of emissions. For all models except the i940, idle mode energy consumption was the largest source of GHG emissions. Circuit boards and electronics was the next largest GHG emissions source for all models. Electricity at the manufacturing plant, plastics, operating energy from other modes and ferrous metals were the other key GHG emissions sources. About 10% of the GHG emissions are from other sources.

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

Scanner Model	Idle Energy	Energy - Other operating modes	Circuit Boards and Electronics	Plastics	Ferrous Metals	Electricity at Manufacturing Plant	Miscellaneous
710	40%	5%	16%	6%	8%	13%	12%
730EX	40%	5%	16%	6%	8%	13%	12%
i940	4%	16%	35%	16%	2%	13%	13%
i1150	38%	3%	18%	13%	4%	13%	11%
i1150WN	38%	11%	18%	10%	3%	11%	9%
i1190	38%	3%	18%	13%	4%	13%	11%
i1190E	38%	3%	19%	13%	4%	13%	11%
i1190WN	38%	11%	18%	10%	3%	11%	9%

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 710 was less efficient for both operating GHG emissions and material and manufacturing GHG emissions than the other desktop scanners despite a higher scan volume. Increased energy consumption in the Scan Station 700 series is largely attributed to the additional Network Scanner functionality (does not require a PC). The i940 was less efficient for materials and manufacturing as expected for the lowest volume scanner, and the wireless models, i1150WN and i1190WN were less efficient than their non-wireless versions, i1150 and i1190, due to higher operating energy and components necessary for wireless functionality. The i2000 series had higher transportation GHG emissions and the larger scanners had more GHG emissions associated with cleaning supplies, since the smaller models do not purchase cleaning supplies. The i1100 non-wireless models were the most efficient of the smaller scanners, due to the lower idle energy in these newer models and the lack of energy consuming wireless feature.

Key conclusions from this study are:

1. This report provides full life cycle GHG emissions for eight desktop scanners sold by Kodak Alaris that were calculated according to the ISO 14044 standard. Results were generally consistent with the overall results from previous life cycle assessments of other scanners, although differences are noted in the report due technological improvements, different customer use patterns, and different shipping modes and distances.

2. The key life cycle sources of GHG emissions were operating energy, primarily power consumption during the idle mode and the materials and manufacturing of the scanners. Circuit boards and electronics, plastics, and ferrous metals were the key materials and components that contributed to life cycle GHG emissions. Electricity consumption at the scanner manufacturing facility was the other significant source of GHG emissions.

3. The i940 and the i1100 series scanners had a better GHG emissions efficiency than the 700 series scanners due to both lower scanner weight per scan and lower energy consumption during operation, particularly the idle mode. Energy consumption in the Scan Station 700 series is largely attributed to the additional Network Scanner functionality (does not require a PC). The wireless models produce 27% more GHG emissions than the equivalent non-wireless models based on the same use scenario – due to components and processes necessary for the additional wireless functionality.

4. For all the scanners evaluated, except the i940, reductions in idle mode power consumption or reduced time spent in idle mode after scanning are the most obvious ways of significantly reducing GHG emissions. Energy consumption in the idle mode contributes about 40% of the total GHG emissions for all models except the i940. Reductions in circuit boards and in total weight and reductions in manufacturing electricity are the other key means of materially reducing GHG emissions.