Electronics
Case study Metech Recycling (UK), Ltd.

Metech Recycling (UK) Ltd. is a mid-size company, but one of the largest electronics recycling, refurbishment and resale enterprises in Wales (www.metechrecycling.uk.com/). The Metech facility in Aberdare extends to a site of over 35,000 sq ft. and is a triple ISO accredited one stop service provider offering an environmentally sustainable total waste management solution.

Disassembly of electronics devices at Metech is done manually and largely also non-destructive as component reuse is an important economic pillar: Tablets are disassembled to get hold of displays for repair purposes. Such dismantling activities can be done economically due to the value of reusable parts and if a larger batch of same product models is acquired, which speeds up the dismantling process significantly. Computers are dismantled for resale of RAM memory modules, printed circuit boards are sorted in different grades, hard disk drives undergo certified data erasure, and displays are taken off monitors and laptops for further downstream material recycling. Large LCD monitors and LCD TVs show up as a growing e-waste flow at Metech, but also CRTs are recycled and numerous other kinds of WEEE are processed. Metech sells dismantled components and refurbished products in an on-site walk in shop and online through an ebay shop (http://stores.ebay.co.uk/Metech-Recycling-UK-Ltd).

The effect of resource savings and greenhouse gas reductions through lifetime extension matters for Metech internally and for external communication. Ecodesign Center Wales has been in contact with Metech already before for a project on critical raw materials in Wales. Dominique Lyons, EDC, approached Rhys Charles, Metech, for an "LCA to go" session, which was attended also by Karsten Schischke, Fraunhofer IZM, in Aberdare.

As a typical computer product to be refurbished at Metech, Rhys chose a Fujitsu Esprimo P2540. Most of the specification can be derived from Fujitsu's comprehensive product documentation, which also includes the annual power

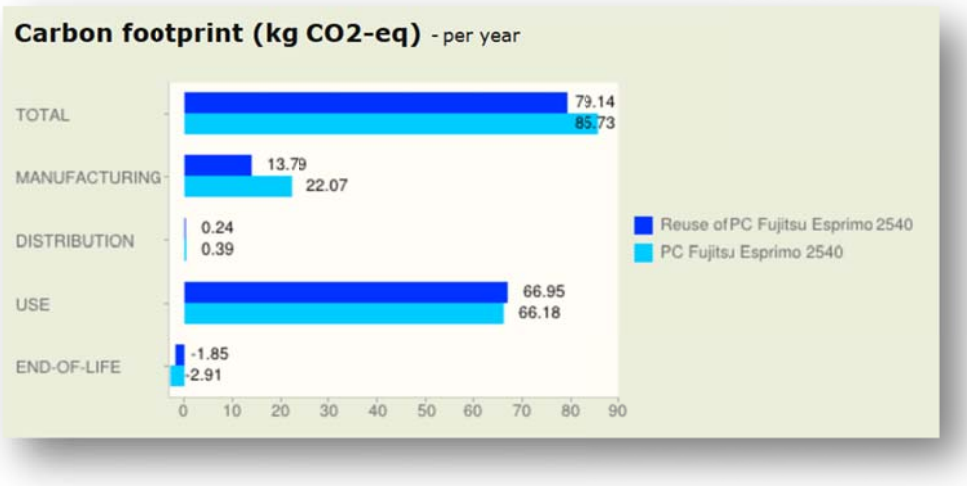
consumption of 137.8 kWh (TEC in Energy Star terminology), referring to Energy Star specification 4.0, which is outdated in the meantime as it is a somewhat older product generation, thus datasheet. However, for an assessment to be coherent with the manufacturer's own data, it is recommended just to mirror the stated values in the "LCA to go" modelling. The baseline scenario builds on the assumption that this computer makes it to Metech after a first life of 5 years.

	CF	Cu	Au	Ta	oREm	In	Co	Al	Stl	Nd	Pt,Ru,Pd
	kg CO_2-eq	g	g	g	g	g	g	g	g	g	g
TOTAL per product lifecycle	428.66	131.42	0.04	0.01	-	-	0.00	384.83	2173.50	0.70	0.00
MANUFACTURING	110.36	150.98	0.05	0.01	-	-	0.00	560.06	3315.40	0.70	0.00
Housing & internal structural elements	42.18	-	-	-	-	-	-	461.15	2990.00	-	-
Display	-	-	-	-	-	-	-	-	-	-	-
Printed Circuit Board Assemblies	16.26	47.25	0.03	-	-	-	-	-	-	-	-
Tantalum capacitors	-	-	-	0.01	-	-	-	-	-	-	-
Memory	3.94	-	0.02	-	-	-	-	-	-	-	-
Processor	8.00	-	-	-	-	-	-	-	-	-	-
Storage	10.13	-	0.00	0.00	-	-	0.00	48.00	24.00	0.64	0.00
Optical Disc Drive	1.80	-	-	-	-	-	-	-	-	-	-
Connectivity	-	-	-	-	-	-	-	-	-	-	-
Power supply	18.01	90.00	-	-	-	-	-	-	-	-	-
Cables	-	-	-	-	-	-	-	-	-	-	-
Battery	-	-	-	-	-	-	-	-	-	-	-
Overhead miscellaneous parts	10.03	13.73	0.00	0.00	-	-	0.00	50.92	301.40	0.06	0.00
DISTRIBUTION	1.94	-	-	-	-	-	-	-	-	-	-
Packaging	1.51	-	-	-	-	-	-	-	-	-	-
Transport	0.43	-	-	-	-	-	-	-	-	-	-
USE	330.89	-	-	-	-	-	-	-	-	-	-
Power consumption	330.89	-	-	-	-	-	-	-	-	-	-
Replacement	-	-	-	-	-	-	-	-	-	-	-
END-OF-LIFE	-14.53	-19.55	-0.01	-	-	-	0.00	-175.24	-1141.90	-	-
Reuse	-	-	-	-	-	-	-	-	-	-	-
Recycling	-14.53	-19.55	-0.01	-	-	-	0.00	-175.24	-1141.90	-	-
Housing & internal structural elements	-10.49	-	-	-	-	-	-	-	-1136.20	-	-
Memory	-0.06	-	0.00	-	-	-	-	-	-	-	-
Power supply	-0.54	-12.83	-	-	-	-	-	-	-	-	-
Printed Circuit Board Assemblies	-0.23	-6.38	0.00	-	-	-	-	-	-	-	-
Processor	-0.12	-	-	-	-	-	-	-	-	-	-
Storage	-1.27	-	-	-	-	-	0.00	-	-5.70	-	-

The total carbon footprint of this Fujitsu PC is roughly 430 kg CO_2-eq., thereof 110 kg CO_2-eq. from the initial material acquisition and manufacturing phase. Recycling credits for material recovery is slightly more than 12% of the initial manufacturing carbon footprint, considering a default collection rate of 50% and moderate material recovery rates. At a company like Metech with a sound manual dismantling operation instead of shredder technology a much better separation of individual fractions for recycling can be achieved. The intended scenario however is refurbishing the computer, not material recycling at this point in time and as it is unclear, whether at the end of the second life the Fujitsu PC might show up at Metech again or some other place, it is recommended not to change the default end-of-life scenario.

For the refurbishment scenario a total lifetime of 8 years is anticipated, and as a worst case, that DRAM and hard disk drive have to be replaced. Rhys investigated internally driving distances of the company vans and trucks along with the transported number of units. The assessment result unveils, that these transports

are less relevant for the total carbon footprint as long as larger batches are transported regionally. Consequently, less accuracy is required to allocate exact distances and rough estimates are appropriate. Under these assumptions computer reuse saves 8% of the carbon emissions on per-year-of-use-basis – which is not very impressive but due to the fact, that the use phase energy consumption of PCs add a very significant carbon overhead to the life cycle impacts. When looking only at the manufacturing impacts and spare parts production (DRAM and HDD), the benefit of refurbishing is much more evident.



When asked for a comment about the "LCA to go" tool Rhys had the following to say; "Environmental and resource security benefits are at the heart of all the work that we do. It has been a desire of ours to quantify these benefits in a meaningful way for some time using LCA. A numerical demonstration of the benefits of our

operations would be useful to feedback to our customers, to inform internal decisions made concerning our processes in order to maximise the environmental and resource conservation benefits of our operations, and for use in our efforts to educate the public about the global WEEE problem and demonstrate recycling and reuse as a solution. Until now, as an SME we have not had the time and resources to dedicate to LCA studies. The LCA to go tool has simplified the LCA process immeasurably allowing us quickly carry out LCA studies on our products and utilise the outputs to positive effect."