



Electronics Case study PC Lagun



PC Lagun. is a small electronics recycling and refurbishment company operating from Erandio, close to Bilbao (<http://www.pclagun.org/>). PC Lagun is supported by the Basque authorities as a project to provide social enterprises with used IT equipment and donating refurbished units. Their business can be compared rather with an NGO than with a commercial enterprise. Through their website PC Lagun is also selling used equipment to consumers. They source their material mainly from governmental institutions, schools and businesses. The social aspect of providing affordable IT to less privileged people and to do something good for the environment are important to PC Lagun in particular.



Such a company can complement the obvious positive effect of keeping high-tech products in use longer with environmental facts, if they are provided with a simple, but transparent calculation tool. Karsten Schischke, Fraunhofer IZM, provided an online training for PC Lagun to familiarize Ramón Barrenetxea, coordinator of the project PC Lagun, and his staff remotely with environmental assessments and the "LCA to go" tool. Although the tool is easy to use for in-house assessments, Ramón mentioned an interest, to get calculations and claims verified also externally.

A refurbished hard disk drive as offered on PC Lagun's website for 15 Euros was chosen as an example, how to calculate environmental claims: The scenario is the comparison of a 10-years old 18 GB HDD being recycled or otherwise given to disposal with the same 3,5" HDD being refurbished by PC Lagun for an anticipated second life of 5 years. The HDD can be modelled through the parameterised model with a single entry in the "LCA to go" tool. The use phase is approximated with 7 W power consumption in times when the PC is in idle mode, i.e. 50% of the time, according to the Energy Star specification. Entering such data without exact measurements is appropriate as the distinction for refurbishment is not based on use-phase power consumption differences but the need to produce less units through refurbishment, i.e. replacing part of the market for new devices by refurbished ones. This comparison might not be fully accurate, if the low costs for used parts mean, that certain consumers buy IT equipment





they otherwise could not afford. Then of course the household penetration with HDDs goes up as a side effect of reuse.

Sourcing used equipment locally within an average distance of 20 km, i.e. the Bilbao region and selling also regionally with an average shipping distance of 100 km, both modelled with a delivery van (average load), results in emissions of roughly 140 g CO₂ equivalents, compared to 10 kg CO₂-eq. for initial production of such an HDD.

My products > HDD, refurbished, use in Spain > Environmental Assessment > Data entry

Product Assessment Data Entry

Scenario > Manufacturing > Distribution > **Use** > End-of-life > KEPIs Selection

Power Consumption

Mode	Place of Use	Time in this mode (%)	Consumption	Unit
Power long idle	Spain	50.00	7.00	W
Power sleep	Spain	5.00	0.50	W

Transport to repair shop

Transport of the whole device from the user to the repair shop and back (Transport type: "Delivery van")

Distance	Unit	Amount	Unit	Comment
20.0	km	0.7	kg	end of first life -> PC Lagun
100.0	km	0.7	kg	UPS to second consumer

The main use phase entries for the refurbishment scenario are depicted in the screenshot above, considering the refurbishment as a type of repair without replacing parts. The power consumption for testing and data erasure is not covered in this model, but can roughly be estimated to be less relevant than all other factors: Even if testing and data erasure requires several hours and the

testing equipment is included, related carbon emissions will hardly exceed 100 g CO₂-eq. (which corresponds to 0.4 kWh for the Spanish power grid mix).

	CF
	kg CO ₂ -eq
TOTAL per product lifecycle	125.81
▶ <input checked="" type="checkbox"/> MANUFACTURING	10.01
▼ <input checked="" type="checkbox"/> DISTRIBUTION	0.45
<input type="checkbox"/> Packaging	0.30
<input type="checkbox"/> Transport	0.15
▼ <input checked="" type="checkbox"/> USE	116.60
▶ <input type="checkbox"/> Power consumption	116.46
▼ <input type="checkbox"/> Replacement	0.14
Spare parts	-
Transport	0.14
▼ <input checked="" type="checkbox"/> END-OF-LIFE	-1.25
▶ <input type="checkbox"/> Reuse	-
▶ <input type="checkbox"/> Recycling	-1.25

The total life cycle carbon footprint of such a refurbished 3,5" HDD over 15 years is roughly 126 kg CO₂-eq. The use phase power consumption clearly is the dominating factor. The main difference between refurbishing and not refurbishing however is with the saved manufacturing of theoretically ½ HDD. On the other hand, also the recycling credits for ½ HDD have to be subtracted from the overall credits as material of only one HDD will be recovered within 15 years instead of 1.5 HDDs.



The replacement of 1.5 new HDDs by a lifetime extension from 10 to 15 years thus results in calculated greenhouse gas emission savings of roughly 4.2 kg CO₂-eq.

Such values can be used now to inform consumers about the environmental benefits of buying a used HDD, such as: "With ordering this refurbished HDD you save 4.2 kg CO₂-eq. compared to buying a new one." Similar, for businesses giving IT equipment to PC Lagun for refurbishment and resale the total environmental credit can be modelled, stating the carbon savings effect from responsible refurbishment compared to standard recycling practice.