



# University of Babylon

## Electronic Waste Classification and Management in the University of Babylon

By

Dr. Wisam Sh. J. Al-Salami

University of Babylon, Babylon Province, Iraq

### **Part one: E-Waste Classification:**

The classification of the E-waste is made based on the UNU-KEYS and the Waste electrical and electronic equipment (WEEE) under the EU categories of Waste classification. The six categories of E-waste were covered the relational waste keys in the UNU-KEYS as explained below:

The categories are:

<b>Category Name</b>	<b>Category Symbol</b>
Large equipment	C1
Small equipment	C2
Temperature exchange equipment	C3
Small IT	C4
Screens and monitors	C5
Lamps	C6

**Category One:**

**Large equipment**



<b>A- Central Heating (household installed)</b>	<b>B- Photovoltaic Panels (incl. inverters)</b>	<b>C- Professional Heating &amp; Ventilation (excl. cooling equipment)</b>	<b>D- Dishwashers</b>
<b>E- Kitchen equipment (e.g. large furnaces, ovens, cooking equipment)</b>	<b>F- Washing Machines (incl. combined dryers)</b>	<b>G- Dryers (wash dryers, centrifuges)</b>	<b>H- Household Heating &amp; Ventilation (e.g. hoods, ventilators, space heaters)</b>
<b>I- Professional IT equipment (e.g. servers, routers, data storage, copiers)</b>	<b>J- Professional Tools (e.g. for welding, soldering, milling)</b>	<b>K- Leisure equipment (e.g. sports equipment, electric bikes, juke boxes)</b>	<b>L- Professional medical equipment (e.g. hospital, dentist, diagnostics)</b>
<b>M- Professional Monitoring &amp; Control equipment (e.g. laboratory, control panels)</b>	<b>N- Non- cooled Dispensers (e.g. for vending, hot drinks, tickets, money)</b>		

# Small equipment



## Category Two:

A. Microwaves (incl. combined, excl. grills)	B. Other small household equipment (e.g. small ventilators, irons, clocks, adapters)	C. Equipment for food preparation (e.g. toaster, grills, food processing, frying pans)	D. Small household equipment for hot water preparation (e.g. coffee, tea, water cookers)
E. Vacuum Cleaners (excl. professional)	F. Personal Care equipment (e.g. toothbrushes, hairdryers, razors)	G. Small Consumer Electronics (e.g. headphones, remote controls)	H. Portable Audio & Video (e.g. MP3, e-readers, car navigation)
I. Music Instruments, Radio, Hi-Fi (incl. audio sets)	J. Video (e.g. Video recorders, DVD, Blue Ray, set-top boxes) and projectors	K. Speakers	L. Cameras (e.g. camcorders, photo & digital still cameras)
M. Small lighting equipment (excl. LED & incandescent)	N. Household Luminaires (incl. household incandescent fittings & household LED luminaires)	O. Professional Luminaires (offices, public space, industry)	P. Professional Luminaires (offices, public space, industry)
Q. Household Tools (e.g. drills, saws, high pressure cleaners, lawn mowers)	R. Toys (e.g. car racing sets, electric trains, music toys, biking computers, drones)	S. Household medical equipment (e.g. thermometers, blood pressure meters)	T. Household Monitoring & Control equipment (alarm, heat, smoke, excl. screens)

**Category Three:**

**Temperature exchange  
equipment**



A. Fridges (incl. combi-fridges)	B. Freezers	C. Air Conditioners (household installed and portable)	D. Other cooling equipment (e.g. dehumidifiers, heat pump dryers)
E. Professional cooling equipment (e.g. large air conditioners, cooling displays)	F. Cooled Dispensers (e.g. for vending, cold drinks)		

**Category Four:**

**Small IT**



A. Small IT equipment (e.g. routers, mice, keyboards, external drives & accessories)	B. Desktop PCs (excl. monitors, accessories)	C. Printers (e.g. scanners, multi-functionals, faxes)	D. Telecommunication equipment (e.g. cordless phones, answering machines)
E. Mobile Phones (incl. smartphones, pagers)	F. Game Consoles		

**Category Five:**

Screens and monitors



A. Laptops (incl. tablets)	B. Cathode Ray Tube Monitors	C. Flat Display Panel Monitors (LCD, LED)	D. Cathode Ray Tube TVs
E. Flat Display Panel TVs (LCD, LED, Plasma)			

**Category Six:**

**Lamps**



<b>A. Compact Fluorescent Lamps (incl. retrofit &amp; non-retrofit)</b>	<b>B. Straight Tube Fluorescent Lamps</b>	<b>C. Special Lamps (e.g. professional mercury, high &amp; low pressure sodium)</b>	<b>D. LED Lamps (incl. retrofit LED lamps)</b>
---	---	---	--



## **Part Two: E-Waste Management:**

### **E-Waste management key points:**

#### A- Collection Systems:

- Establish efficient collection systems for e-waste that encourage proper disposal and recycling.
- Set up collection points or centers where individuals can drop off their old electronic devices.

The quantities auditing of E-Waste is made for each month then the data calculated as annual E-Waste production for each faculty in the university. The following table showed example for the monthly E-waste production in the faculty of Engineering:

No.	Category Symbol	Production Weight (kg)	Notes
1	C1-J*	121	Sorting and well equipped
2	C2-M	4	Well equipped for Safety
3	C3-B	25	Check for Recovery
4	C5-A	34	well equipped

\* Category 1: Large equipment, subcategory J: Professional Tools (e.g. for welding, soldering, milling)

## B- Public Awareness:

Educate the public about the importance of e-waste recovery and the potential environmental and health hazards associated with improper disposal.

## C- Legislation and Regulation:

- Implement and enforce regulations that promote responsible e-waste disposal and incentivize recovery efforts.
- Encourage producers to take responsibility for the end-of-life management of their products.

## D- Recycling Facilities:

Invest in and support recycling facilities that specialize in the recovery of valuable materials from electronic waste.

## E- Resource Extraction:

Promote the recovery of valuable resources, such as precious metals, from e-waste to reduce the need for raw material extraction.

### **Key Points for Safety Disposal E-Wastes:**

1. **Avoid Direct Contact:** When handling e-waste, avoid direct skin contact. Wear gloves to protect hands.
2. **Ventilation is Key:** Work in well-ventilated areas to minimize exposure to potentially harmful substances.
3. **Unplug Before Disposal:** Always unplug electronic devices before attempting to recycle or dispose of them.
4. **Separate Batteries:** Remove batteries from electronic devices before disposal, as they can contain hazardous materials.
5. **Follow Disposal Guidelines:** Dispose of e-waste according to local regulations. Many areas have specific collection points or recycling programs for electronic devices.
6. **No Burning:** Never burn electronic devices. This can release toxic chemicals into the air.
7. **Avoid Water Exposure:** Keep e-waste away from water sources to prevent potential contamination.
8. **Recycle Responsibly:** Use authorized recycling facilities that adhere to proper environmental and safety standards.
9. **Data Security:** Ensure all personal data is securely erased from electronic devices before disposal to protect the privacy.
10. **Educate Others:** Spread awareness about e-waste safety to friends, family, and colleagues to promote responsible disposal practices.

## References:

Crowe, D. M., Elser, D. A., Göpfert, B., Mertins, L., & Al., E. (2003). Waste from electrical and electronic equipment (WEEE) - quantities, dangerous substances and treatment methods. *European Environment Agency, 1*, 37.

Cui, J., & Roven, H. J. (2011). Electronic Waste. *Waste, December 2011*, 281–296. <https://doi.org/10.1016/B978-0-12-381475-3.10020-8>

Gaidajis, G., Angelakoglou, K., & Aktsoglou, D. (2010). E-waste: Environmental problems and current management. *Journal of Engineering Science and Technology Review, 3*(1), 193–199. <https://doi.org/10.25103/jestr.031.32>

Gandhi, N. (2014). *Health and Safety issues in Electronic Waste. December 2010.*

Garg, R., Dang, S., & Gauba, P. (2022). *E-waste : A Concern E-waste : A Concern. December.*

Kingdom, U. (2008). *Waste Electrical and Electronic Equipment (WEEE). August 2007.*

Kowsar, R., Hashia, P. H., & Khan, P. F. (2010). e-Waste and Its Health Impacts. *Global Journal of Human Social Science, 10*(4 (version 10)), 88–91. <http://www.researchgate.net/publication/235957919>

Kuehr, R. (2015). *E-waste statistics : Guidelines on classifications , reporting and indicators . TASK GROUP ON MEASURING E-WASTE* (Issue February).

Savage, M. (2006). Implementation of the Waste Electric and Electronic Equipment Directive in the EU. In *Institute for Prospective Technological Studies.*