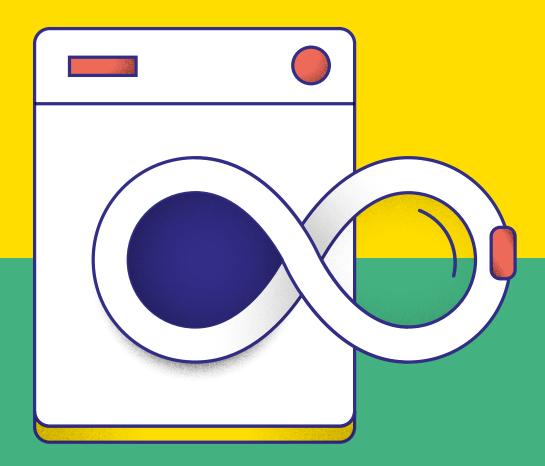


### **ELECTRICAL APPLIANCES AND**

### CIRCULAR ECONOMY



Examples of good practices in handling electrical and electronic equipment in the context of circular economy.

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### Introduction

Electrical and electronic devices have become indispensable parts of our daily lives. Some devices are used for communication and accessing information, others make physical tasks easier or increase comfort, and some serve purely for entertainment and leisure. Nowadays it is hard to imagine life without smartphones, computers, household and work appliances, and entertainment electronics.

This, of course, is not a problem – as long as we are aware that the use of these devices generates waste and do everything possible to prevent it. But how can we do this? This guide will help.

Inside, you will find brief descriptions of practical examples of good practices in the field of the circular economy, specifically in the context of the extended waste management hierarchy, particularly concerning waste electrical and electronic equipment (WEEE). The purpose of this guide is to encourage users — individuals as well as governmental and non-governmental organizations — to adopt practical measures that reduce negative environmental impacts and contribute to a more sustainable future.

The concept of the waste management hierarchy first appeared in 1957 in Waste Directive 75/442/EEC, which states that "member states shall take the necessary measures to encourage the prevention, recycling, and processing of waste, the recovery of raw materials and, where possible, energy from waste, as well as any other processes for the reuse of waste." The term itself was first introduced in the European Union in 2008 in Directive 2008/98/EC. Article 4 clearly defines the following hierarchy:

- · waste prevention
- · preparation for reuse
- · recycling
- · other recovery, such as energy recovery
- · disposal

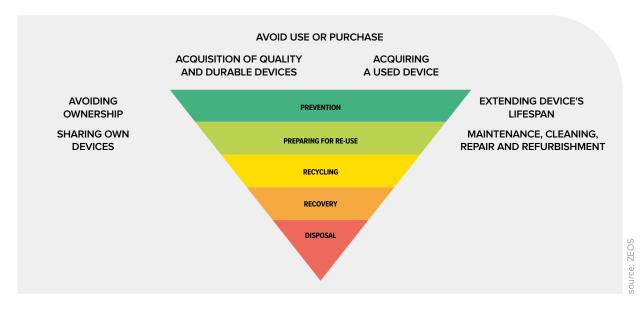
In recent years, non-governmental organizations, experts, and environmentally conscious consumers have increasingly emphasized that this hierarchy needs updating, as it is ineffective in addressing modern sustainability challenges. They stress the importance of focusing more on the first two steps – waste prevention and reuse. Measures to achieve this include:

- · avoiding purchase and ownership
- · buying high-quality and second-hand equipment
- · extending the lifespan of devices

Greater emphasis should, therefore, be placed on preventing waste generation, particularly on steps preceding recycling. This can be achieved by considering:

- Is the purchase or use really necessary? (avoiding unnecessary purchases or use)
- Can the device be borrowed instead? (avoiding ownership)
- Can a second-hand or refurbished device be acquired? (obtaining used equipment)
- Is the device designed for durability, repairs, and/ or upgrades? (buying quality devices with a long lifespan)
- Can the device be maintained, cleaned, and serviced? (extending the lifespan of owned devices)
- Does someone else still need the device? (sharing existing devices)
- Can a working device be passed on to someone else rather than discarded? (reuse through exchange, donation, or sale)

In the following sections of this guide, you will find examples of good practices that will help answer these questions. This way, you can use electrical and electronic devices sustainably and enjoy their benefits without guilt!



### Mindful Purchase of a New Device

By making a conscious purchase, we fulfill two key requirements of sustainable use: avoiding unnecessary purchases and encouraging reuse. Before buying a device, we should consider whether we truly need it. If the answer is no, the most environmentally friendly decision is to forgo the purchase and avoid using the device altogether (prevention). If the answer is yes, we should check whether we can borrow the device instead. This can be done through formal, informal, or market-driven sharing communities.

If purchasing a device is unavoidable, it should be a well-considered decision. This means choosing an appliance designed for long-term use, thereby diminishing environmental impact. We should opt for high-quality devices that are designed to be repairable, upgradeable, and reusable (reuse).

Before making a purchase, we should check whether spare parts and technical or service support are available for the selected device. This ensures that the device can be repaired and its lifespan extended in the event of a malfunction. Examining how the device is designed and manufactured is essential: does it allow access to components that may need to be replaced or repaired? Additionally, we should consider whether the device can be upgraded physically and in terms of software. Therefore, it is essential to check how long software updates will be available for the chosen device and whether individual components can be replaced to avoid having to replace the entire appliance.



Did you know that the company Fairphone produces smartphones that are easy to repair and upgrade, offering at least ten years of software update support?





# Formal Sharing Community

Many devices, especially power tools for home improvement, construction and gardening, are intended only for a specific task (e.g. a drill for drilling a hole). This means, that they are not used daily, but are usually needed only a few hours per year. For these kind of devices and tools, the best option is to borrow them. To facilitate this, formal sharing communities exist—organized groups of individuals who agree to share items. Their operation is based on predefined rules, which can be simple (e.g., who stores the items and how borrowing works) or more structured (e.g., collecting funds for maintenance and repairs, tracking usage records). Members join the sharing community by contributing either their own tool or a financial investment

towards the shared purchase of a specific tool.

Formal sharing communities often emerge among colleagues, friends, or association members who have shared needs for certain tools. A key feature of these communities is that they usually involve a small, well-connected group of people, which makes organization and operation easier.

#### **Examples of Formal Sharing Communities:**

- 1 ZEOS d.o.o., as part of the LIFE Turn to e-circular project (LIFE18 GIE/SI/000008), collaborated with the Slovenian Mladinska mreža MaMa and youth centers to establish sharing points in eight youth centers. There, young people can borrow or share electrical and other devices, promoting circular economy principles and sustainable practices.
- 2 Employees at ZEOS d.o.o. have set up a sharing corner in their offices. Using their financial contributions, they purchased selected devices that are typically used only a few times per year, such as a steam cleaner, a high-pressure washer, a wet-dry deep vacuum cleaner, and a leaf blower. By borrowing these devices, employees share the costs of purchasing and repairing them. Additionally, since the devices are stored at the company, employees save space at home that would otherwise be needed for storage.



rce: arhiv ZEOS

# **Library** of Things

A special category of formal sharing communities is the so-called library of things. These are usually non-profit organisations, offering lending services for a wide varierity of items for work and leisure, designed based on the principles of traditional library lending. On the shelves you will usually find items that an average user uses only occasionally, such as beforementioned power tools. These libraries serve as an alternative to conventional purchasing, allowing users to save space, time, and money.

Similar practices to libraries of things include informal and formal sharing communities, which differ mainly in scale and purpose. A library of things is designed for the wider community and provides access to a broad selection of general-use items. In contrast, sharing communities, whether formal or informal, usually consist of smaller, more connected groups of people and focus on sharing specific items - e.g. sharing snow shovels in an aparament building.

A map of the European libraries of things, along with videos explaining how they operate, can be found at: https://lte.erasmus.site/platform/



Did you know that ZEOS d.o.o., as part of the LIFE Turn to e-circular project (LIFE18 GIE/SI/000008), collaborated with Ljubljana's library of things to create a brochure titled "Library, Establish Yourself," which provides lots of practical information?



Set up a library



# Informal Sharing Community

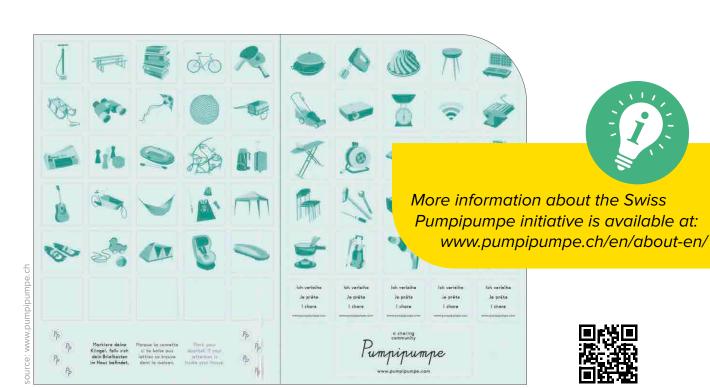
In addition to formal ones, there are also so-called informal sharing communities. These include various spontaneous or partially organized forms of sharing items between individuals. They range from simple neighbourly borrowing of personal belongings, such as tools or household appliances, to joint ownership of items that individuals tend to use only occasionally.

A common characteristic of informal sharing communities is that they do not rely on formal agreements or financial transactions but on mutual trust and reciprocity. Such practices enable more efficient resource use and encourage social connections within local communities, where individuals support one another.

#### **Examples of Informal Sharing Communities:**

- 1 In an apartment building, residents jointly purchased a snow shovel, a drill, etc., and store them in shared spaces. If neighbours need a shovel to clear the snow from the parking lot or a drill to make a hole in their apartment, they can borrow these items from the janitor.
- 2 The Swiss initiative Pumpipumpe created a collection of stickers featuring some of the most commonly borrowed items. Households can place these stickers on their mailboxes to inform neighbors which items they are willing to lend.

Informal sharing communities also frequently emerge on social media platforms. Interest-based Facebook groups or groups linked to a specific town or neighborhood often facilitate requests for borrowing items.



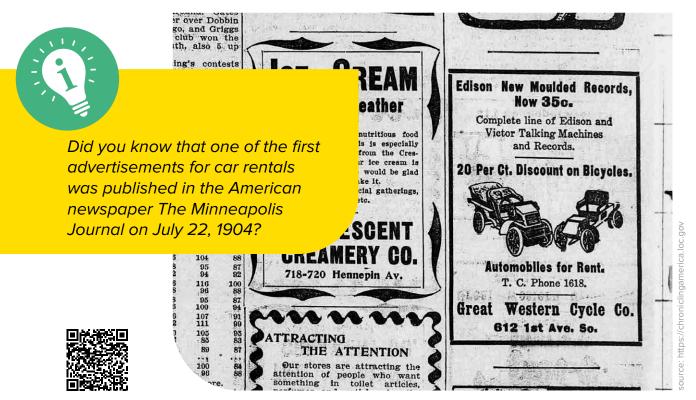
# Market-Oriented Sharing Community

A market-oriented sharing community is a financially sustainable form of sharing goods and services that operates in a commercial model and represents an example of a circular business model. Unlike non-profit sharing communities (such as a library of things), a market-oriented sharing community functions based on offering services on the market with intent of generating financial profit.

These communities provide access to specialized goods and services that are often expensive or require complex maintenance, such as tools, cars, or event equipment. The model relies on professional management and maintenance of items, enabling customers access to high-quality service and reliable equipment without the need for ownership.

#### **Examples of Market-Oriented Sharing Communities:**

- 1 For residents in urban areas with access to efficient public transport who need a vehicle only a few times a year, owning a car is neither necessary nor practical. In such cases, short-term rental is recommended instead of ownership. Typically, vehicles can be rented from traditional car rental companies or through modern car-sharing platforms, particularly for electric vehicles.
- 2 Another well-known example of market-oriented sharing communities are self-service laundromats, which enable shared use of washing machines and tumble dryers. Users can access washing and drying facilities without buying and maintaining their own equipment. Some individuals use laundromats regularly, while others rely on them only when their machines break down or when washing large items such as blankets.



### Used and Refurbished Equipment

If there is no sharing community in your area or you plan to use a device frequently enough to justify purchasing it, you should check whether you can buy a used or refurbished device. This type of purchase is one of the most effective ways to prevent waste generation, especially for electrical and electronic equipment. Besides its sustainability benefits, buying used or refurbished devices is often more affordable than purchasing new ones.

You can buy used and refurbished equipment from various sources. Purchasing from certified repair shops or stores specializing in selling such equipment is recommended, as these devices are usually inspected, repaired, and prepared for reuse. These businesses also often provide warranty options. If no such stores are available in your area, you can browse dedicated online marketplaces, ad websites,

such as eBay, and various Facebook groups. Ads for buying and selling used equipment often appear on local websites, forums, and bulletin boards in stores and shopping centers. In Slovenia, used equipment can also be purchased at the so-called reuse centers and other specialized second-hand stores.



### Reuse Center

A reuse center (center for reuse and upcycling or CPU in Slovenia) is a second-hand store where visitors can purchase items and/or drop off functioning devices and items they no longer need. The staff at the reuse center inspects these items, cleans, repairs, or refurbishes them if necessary, and then offers them for resale, usually at affordable prices.

The main benefits of these centers include direct waste reduction, job creation and circulation of used and refurbished equipment within the local community.

Most reuse center in Slovenia operate under the umbrella of social enterprises, local communities, or municipal utility companies. This organizational structure ensures a steady supply of usable items. It also allows municipal companies to actively participate in waste prevention and reuse, which are at the top of the waste management hierarchy.

A map of Slovenian reuse center is available at https://www.zeos.si/en/collection-points/ Contact details for individual centers can be found at https://www.zeos.si/en/purchase-of-appliances/



Click here to calculate the CO2 you can save by re-using MEMBER AREA CONTACT US O

RREUSE is an international network representing social enterprises active in re-use, repair and recycling.





In Europe, there is an international association called RREUSE (Reuse and Recycling European Union Social Enterprises), which represents social enterprises active in reuse, repair, and recycling. The association supports reuse centers by: sharing best practices, advocacy at different levels and participation in international projects promoting the circular economy. More information is available at: https://rreuse.org



Social Inclusion



#### LATEST NEWS







Social and circular



https://rreuse.org

source: https://rreuse.org

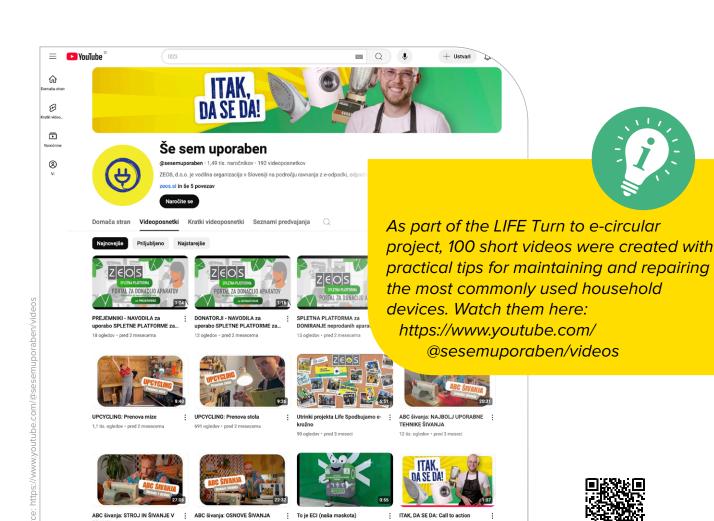
# Maintenance, Cleaning, Repair, and Restoration

Whether we have purchased a new, used, or refurbished device, ensuring it functions for as long as possible is essential. We can achieve this through proper and regular maintenance, occasional cleaning, and timely repairs. By performing regular upkeep and addressing minor issues early, we can prevent them from escalating into major breakdowns requiring expensive repairs or device replacement. Proper maintenance also ensures optimal performance of all device components, reducing wear and tear, and extending its lifespan.

Aditionally, regular maintenance significantly improves device efficiency, thereby reducing energy consumption. Moreover, it helps preserve the device's value, which is beneficial if we decide to sell it later. Maintenance instructions and recommended servicing procedures are usually provided when purchasing the device; some manufacturers publish them online.

For more practical information on general maintenance and basic repairs of common household appliances, visit these online platforms:

- www.ifixit.com
- www.instructables.com/workshop/repair/projects
- www.wikihow.com/Main-Page
- · www.sosav.fr
- www.hometips.com/repair-fix
- · www.lifehacker.com/home
- · www.familyhandyman.com/house-and-components



# **Encouraging Repairs**

Despite careful maintenance and cleaning, most devices will eventually break down. While many repairs can be done independently, some require special tools or technical expertise that the average user does not have. In such cases, professional repair services are needed.

However, with the low cost of new appliances, consumers often face the dilemma of whether repairing an old device is economically sensible. In many cases, the cost of repairs is similar to or even higher than buying a brand-new device with a warranty, so there is no incentive to repair broken devices. To counter this, two successful solutions have emerged: repair vouchers and the development of community repair workshops (repair cafés).

Repair Vouchers Example - Austria launched a fouryear initiative called "Reparaturbonus" in 2022. In this initiative, the Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology subsidizes 50% of repair costs, up to a maximum of € 200 per repair. By September 2024, this financial support has helped repair more than 35,000 devices. More details on this initiative are available at: https://www.reparaturbonus.at/

Another effective initiative are community repair workshops, where participants can repair broken items and extend their lifespan. These spaces typically provide: a workspace and necessary tools, experienced repair professionals who assist with the process, hands-on learning, allowing participants to gain skills for future repairs. The most known example is The Repair Café Foundation from the Netherlands. Learn more about it here: https://www.repaircafe.org/en/





# Selling, Exchanging, and Donating

Eventually, we all end up owning a device we no longer need. This could be due to an impulse purchase, an unwanted gift, an upgrade to a newer model, or simply changing needs. Before throwing such a device away, consider whether someone else could still benefit from it. This is especially true for high-quality devices that have been well-maintained, serviced, and regulary cleaned. Reusing second-hand devices—whether through exchange, donation, or sale—is one of the most effective ways to reduce waste. On one hand, it prevents a working device from becoming waste, and on the other, it avoids the need to buy a new device that would also eventually become waste.

Selling second-hand items is among the most widespread and popular circular economy practices. Sellers get rid of a device they no longer need while recovering part of their original investment, and buyers obtain a needed device at a lower price than a new equivalent. Sales take place through various online and physical platforms. Some of the most well-known include: online marketplaces: eBay, Facebook Marketplace, social media groups, garage sales and flea markets, consignment stores and pawnshops.

An even better option is to give the device to someone in the local community. You can: ask family and neighbours if they need it, post a notice on a community bulletin board or in a local store, check with charities, schools, libraries of things, reuse centers, and nonprofit organizations to see if they could use it. In Slovenia, if you cannot find a direct recipient but still want your device to remain in use, you can donate it to Reuse Corners (Kotiček ponovne uporabe).





Did you know that ZEOS d.o.o. created a donation portal as part of the LIFE Turn to e-circular project (LIFE18 GIE/SI/000008)? It allows manufacturers and retailers to donate electrical and electronic devices to organizations that support socially vulnerable groups instead of discarding them.

*More information:* 

www.zeos.si/en/business-models/



### Reuse Corner (Kotiček ponovne uporabe)

A reuse corner is a designated space for collecting still-functioning electrical and electronic devices that users no longer need. By placing an item in the reuse corner, donors indicate that the device is still operational. The reuse corners established by ZEOS are typically located at municipal utility facilities across Slovenia. Their purpose is to encourage the reuse of devices, ensuring that still-functional appliances do not end up as waste. This extends the lifespan of devices while also reducing waste generation. Devices collected in reuse corners are inspected and prepared for reuse by partner organizations, such as reuse centers, where they are later sold at affordable prices. More information about reuse corners in Slovenia is available here: https://www.zeos.si/en/ re-use/

Similar initiatives exist abroad, such as the Social ReUse project in Luxembourg, launched by Ecotrel. This project allows residents to drop off functioning devices at special collection points called "diagnostic stations." The donated devices are then: collected by project partners, repaired, prepared for reuse and resold at discounted prices. The project also includes collection of IT equipment. Besides extending product lifespans and conserving resources, Luxembourg's reuse corners aim to promote social

inclusion, as refurbishment is often carried out by socially excluded groups. More information about reuse corners in Luxembourg is available here: https://www.ecotrel.lu/en/news/social-reuse





### **Making E-Waste Disposal More Convenient: Street Containers,** Mobile Collection, and **In-Store Collection**

Regardless of all the previously mentioned waste management hierarchy steps-maintenance, repair, resale, and reuse-every electrical and electronic device will eventually become waste.

E-waste can be a valuable resource (containing materials like gold, silver, platinum, and copper) but also a source of hazardous substances (such as lead, mercury, and cadmium). If not handled properly, these substances pose significant environmental and health risks. In the context of circular economy, it is essential to provide consumers with the most convenient way to dispose of e-waste properly and separate from other waste. This way of collection ensures that valuable materials are recycled while hazardous substances are safely processed and disposed of. At ZEOS d.o.o., we highlight three good practices in e-waste collection: mobile collection, street containers, green corners in stores.

A mobile container is a specially designed container unit transported by a truck to different locations across the country. It allows residents to quickly

and conveniently dispose of their electronic waste. This collection method is especially useful in smaller municipalities and remote areas without permanent collection points or where e-waste collection sites are too far away. Street containers are designed for the separate collection of small waste electrical and electronic equipment (WEEE) and batteries. They are usually placed in accessible public areas within densely populated residential neighborhoods. Their presence provides two major benefits: the high number of containers reduces the distance consumers must travel to dispose of e-waste and their visibility (achieved through distinctive design) that is continiusly raising awareness about proper e-waste disposal and encourages responsible behavior.

Green corners is an initiative by ZEOS d.o.o., allowing Slovenian consumers to conveniently dispose of e-waste in stores. These dedicated in-store collection areas provide bins for the separate collection of small household appliances, batteries, and light bulbs, ensuring easy and proper disposal while shopping.



# Competition and WEEE Collection – Firefighters' Collection Initiatives

Some countries have successfully engaged firefighters' associations in the separate collection of waste electrical and electronic equipment (WEEE). Two notable examples of this practice within the European Union are Portugal and the Czech Republic.

In Portugal, firefighters collect waste electrical and electronic equipment through the Quartel Electrão initiative, organized by Electrão, a producer responsibilty organisation (PRO). This program encourages participation through a competitive approach—firefighting associations compete to collect the largest amount of WEEE. Winners receive practical rewards, such as fire trucks and other essential equipment, which support their daily operations.

Goals of the initiave are: increase WEEE collection rates, reduce the environmental impact of improperly disposed waste and support firefighters' associations in carrying out their important duties.

A similar initiative exists in the Czech Republic under the name Recyklujte s hasiči (Recycle with Firefighters), led by the Czech PRO Elektrowin. Firefighters' associations participate in a competition to collect WEEE, and they receive financial rewards based on the amount collected. This initiative involves over 1,700 firefighters' associations, which not only organize WEEE collection but also raise awareness in local communities about the importance of proper e-waste disposal.



The Czech Recycle with Firefighters initiative has been running since 2011. Today, it includes more than 1,700 volunteer firefighters' associations, which have jointly collected over 20,000 tons of waste electrical and electronic equipment.





### Raising Awareness – E-Transformer

Raising consumer awareness about proper waste management is essential for transitioning to a circular economy. Regular and adequate communication enhances individuals' and communities' understanding of the importance of sustainable resource management. This approach helps people grasp the complex concepts of circular economy and its benefits for the environment, economy, individuals, and society. This facilitates changes in consumer habits and encourages transition to a more responsible waste management.

Proper awareness also boosts support for policies and measures promoting circular economy, creating an environment where sustainable practices are widely accepted and implemented.

A notable example of best practices in awareness-raising is the E-transformer vehicle by ZEOS d.o.o. This interactive exhibition space, created by repurposing a large truck, serves as a mobile classroom that travels across Slovenia. It provides visitors with insights into electrical and electronic waste management within the context of circular economy. Events held in the E-transformer promote proper e-waste management and educate the public on other circular economy practices, such as servicing, reuse, and sharing.

The first version of the E-transformer has already become a popular and well-visited exhibit at the Technical museum in Bistra. The latest version of the vehicle (E-transformer 2.0), in addition to displaying historical electrical appliances, also features a demonstration of magnet recycling and educational animations on circular economy. Occasionally, it is even used as a mobile repair workshop for old devices.

One key advantage of the E-transformer's awareness-raising efforts is it's mobility. By traveling to schools and other events across all Slovenia this vehicle helps reach urban populations as well as residents of smaller and remote communities, where such awareness campaigns are typically less frequent or unavailable.





ZEOS d.o.o. has used the E-transformer to visit over 570 locations across
Slovenia in the past ten years.





How can we handle electrical devices and appliances sustainably? How do we follow the waste management hierarchy and the principles of circular economy? It is easier than it might seem at first glance.

- Before using or purchasing an electrical device, always ask yourself if you really need it and how often will you actually use it.
- If you only need the device occasionally, check if you can borrow it instead of buying it.
- If you truly need it and plan to use it frequently, consider buying a second-hand device.
- If purchasing a used device is not possible, make a conscious purchase. Choose a high-quality device with a long lifespan, upgrade options, and repairability.
- Once you own the device, maintain and clean it regularly. If it breaks, repair it. Share it with someone who needs it—a neighbor, family member, or friend.
- If you no longer need the device, try to exchange, sell, or donate it.
- When a device is completely worn out and cannot be reused, repaired, or upgraded, ensure it does not end up in general waste. Instead, dispose of it at a designated collection point. This way, valuable materials can be appropriately processed and recycled, and hazardous substances will not pollute the environment.

Join the conversation on social media and explore the websites of the projects and organizations featured in this guide. Stay up to date with the latest sustainable practices and be part of the movement toward a circular economy. Help spread the word by sharing this handbook and inspiring others.

### **Acknowledgments / About the Project SPODBUJAMO** E-KROŽNO

This handbook was published as part of the LIFE Turn to e-circular project (LIFE18 GIE/SI/000008), co-financed by the European Commission and the Ministry of Environment, Climate, and Energy of Slovenia. Through this project, ZEOS d.o.o., together with its partners, raises awareness among individuals and communities about the circular economy and it's benefits for the environment, individuals, and society. The project also highlights the necessity of transitioning from a linear to a circular economic model. Additionally, the project encourages users of electrical devices to explore alternatives to buying new products, such as reuse, repair, and sharing. This handbook was prepared in collaboration with Knjižnica Reči (Library of Things).

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