

Zero Waste In The Mediterranean

A guide on developing a zero waste
strategy for local municipalities in
the region



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This guidebook has been produced by Jaka Kranjc, Jack McQuibban and Žaklina Žnajder, as Zero Waste Europe experts. Zero Waste Europe is a foundation leading a fast-growing movement of communities, local leaders, businesses, experts, influencers and other “change agents” working towards the same vision: eliminating waste in our society.

Disclaimer

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MED-InA is an EU-funded cooperation project that aims to develop and deploy a Zero Waste methodology fostering the reduction, reuse and recycling of waste in Mediterranean cities. The project involves 7 partners from 5 countries (France, Jordan, Lebanon, Spain, Tunisia) and has a total budget of €2.3 million, of which €2.1 million (90%) is funded by the EU's ENI CBC Med Programme.

More information on the MED-InA project:

www.enicbcmed.eu/index.php/projects/med-ina



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1 INTRODUCTION

Across the world today, people are waking up to the issue of waste. The 20th century was built upon a linear economy, one based upon extraction, consumption, and then disposal of resources. Yet as our economies have grown and with it the volume of waste generated, it has become increasingly clear that this consumption and production model is no longer fit for modern society. The sheer amount of resources that are extracted and then wasted is having a hugely detrimental effect on our climate and biodiversity systems, worsened by the harmful disposal methods, such as burning or landfilling of waste, that many countries still use.

Zero waste is a vision and approach that provides solutions to the environmental meta-crisis we face today. In Europe alone, nearly 400 municipalities have committed to becoming zero waste, implementing community-centered waste prevention strategies that redesign our relationship with nature and resources. Whilst zero waste may have seemed fanciful or wishful thinking only a decade ago, now it is a set of tangible and impactful policies that communities are applying to help them reduce their impact on the environment, protect the health of local citizens, facilitate the growth of a local economy that is resilient and sustainable, all whilst saving costs in traditional waste management.

The zero waste approach is specifically relevant for cities on both sides of the Mediterranean, which face important environmental and economic challenges. Communities in these regions face a myriad of problems specific to the Mediterranean that provide extra barriers when designing and implementing waste prevention strategies. The latest data showcases the extent of the problem - with 200.000 tonnes of plastic waste leaking into the Mediterranean sea each year.¹ From adapting to changing climate and dealing with the volume of tourists any region receives each year, cities and regions from Spain to Jordan and Tunisia are having to manage increasing challenges and rising costs for waste management.

[The MED-InA project](#) proposes to develop and roll out a methodology for a “Zero Waste” public policy adapted to Mediterranean cities as an exemplary and participatory approach for waste reduction, reuse and recycling. The Zero Waste approach offers an alternative option to municipalities, aiming to reduce the amount of waste that is generated through prevention measures, such as reuse, recycling, and the development of local, community-centered activities.

This guidebook has been designed to help local municipalities and waste management professionals adapt the zero waste approach to the Mediterranean

¹ IUCN, 2020: <https://www.iucn.org/news/marine-and-polar/202010/over-200000-tonnes-plastic-leaking-mediterranean-each-year-iucn-report>



context. It has been written by Ekologi brez meja, a Slovenian NGO that has built and coordinated the growth of zero waste municipalities in their country, and Zero Waste Europe, who coordinate the European Zero Waste Cities programme.

To guide the design and content of this guidebook, quantitative and qualitative data from partners in two dedicated MED-InA project workshops and additional consultations have been used. This is to ensure that the guidebook reflects the local realities of municipalities in the Mediterranean. With the right understanding of the local context and needs of the community, zero waste policies and strategies can be tailored and designed specifically to have the greatest impact.

The guidebook is a methodological tool to support municipalities with the key foundations for implementing a zero waste strategy at the local level, specifically adapted to the challenges and opportunities Mediterranean cities face today.

Throughout this guidebook, we provide concrete examples of how zero waste policies and strategies have been successfully applied elsewhere in Europe and across the Mediterranean. For many cities, getting started is the hardest part. This is why the guidebook also provides a set of useful questions to get you started. By capturing the data and preparing answers to these questions, municipalities will have the basic information from which a zero waste strategy can be designed.

The aim of this guidebook is not only to provide the theory and background to zero waste, but also to be used as a practical tool to help implementation on the ground in communities across different Mediterranean contexts. We hope that it provides you with both inspiration and confidence that applying a zero waste approach in your community makes economic, social and environmental sense, helping tackle a myriad of challenges facing us today. The COVID-19 pandemic has exacerbated them, but also laid them bare, providing new justifications and opportunities for a sustainable transition away from our linear models.

Zero waste is about flexibility and this property has been thoroughly tested in 2020. When discussing the topic with our network of cities and other experts, it became clear that those with zero waste strategies had fewer problems adapting to the quick change in food and packaging waste generation, hygiene limits and littering with protective gear. But why believe our anecdotes? Even the European Commission doubled down on their Green New Deal plans, arguing that a shift to a waste-free circular economy is the best way to successfully exit and recover from the ongoing crises².

² EC, 2020: https://ec.europa.eu/commission/presscorner/detail/en/ac_20_602



2 THE ZERO WASTE APPROACH

A DEFINITION OF ZERO WASTE

Zero waste is defined as “the conservation of all resources by means of responsible production, consumption, reuse, and recovery of products, packaging, and materials without burning and with no discharges to land, water, or air that threaten the environment or human health”, by Zero Waste International Alliance (2018)³.

It represents the management of resources and not the waste. Is about closing the loop, boosting circularity in all areas and bringing new values to resources. Zero waste involves **culture change** to embrace the reduction of material and energy use, **the infrastructure design changes** to reflect the priorities of Zero waste hierarchy, while **engaging the community** with active participation and education in the design of the resource management system towards waste reduction.



Zero Waste Hierarchy, 2019 (Zero Waste Europe)

B ZERO WASTE VERSUS TRADITIONAL WASTE MANAGEMENT

³ ZWIA, 2018: <https://zwia.org/zero-waste-definition>



Traditional waste management is known as the linear one, as it is a traditional model based on a “take-make-consume-waste” approach to using resources. Experts say the world will reach a tipping point where it will lose the capacity to sustain itself if we continue with this model.

Following the need to change resource management to a more sustainable one, transition to a circular economy takes place at the local level. A circular economy is a regenerative system in which resource input and waste, emissions, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. Zero waste is a perfect example of circular economy implementation in communities and cities.

“Zero Waste communities are living examples of the Circular Economy, its viability and its environmental, economic, and occupational benefits.”

-- Karmenu Vella, former EU Commissioner for the Environment, Maritime Affairs and Fisheries

If separate collection is done properly then resources previously discarded as waste keep their value and can be recycled into secondary raw materials. When done at scale, this allows for the creation of material banks within cities, replacing current linear resource extraction methods, providing a system for the future where resources can be kept, created and re-used in a circular manner within cities themselves.



C BENEFITS THAT ZERO WASTE BRINGS TO MUNICIPALITIES

With the growth and spread of Zero Waste Cities, we are increasingly being able to capture data and witness the benefits that adopting such policies provides for local communities. Here, we break these down into 3 main categories: economic, social and environmental.

1. Economic resilience

Cities typically commit to zero waste because, in addition to solving a number of social and environmental issues, there are real economic arguments behind the vision. These include:

- When a city wants to prioritise local solutions to prevent waste it is in fact providing business opportunities to local entrepreneurs, whether that is in developing packaging-free alternatives or new business models for electrical appliances. All together this helps to build a social fabric within the community and diversifies the economy, making it more resilient for the future.
- Simply put, if there is less waste to manage then there are lower costs for municipalities. With zero waste, the amount of waste sent for disposal is radically reduced which, as a result, means that the city does not need to pay the costs of disposal which are typically in the order of >€100 per tonne in Europe. Meaning more funds are available either to put back into public services or to reduce taxes for residents.
- Better implementation of separate collection of waste means more quality resources are made available which can continue to be sold on the market, thereby helping to compensate for the initial costs of collection.
- With a waste reduction plan and the roll-out of financial incentives that are adapted to citizens and businesses, everyone saves money. When both businesses and citizens are financially incentivised to produce less waste, they will be able to lower the costs they previously paid for waste management.

2. Social & community cohesion

Zero waste primarily builds on local solutions that will benefit the community first:

- Zero waste is all about local solutions to manage resources. This means investing in new business opportunities that design waste out of the system, in awareness raising and education together with optimising separate collection systems to manage the waste locally. This is in stark contrast to traditional waste management, which is intensive in capital investment and technology. This means investing money in creating local jobs that cannot be de-localised later down the line.
- Not only does zero waste help to create jobs, but it creates social jobs. The material collection and product repair markets are highly inclusive because they can integrate low-skilled workers and groups that were previously left



out of traditional social and economic development. Zero Waste Cities in Europe have seen the emergence of local businesses that increase recycling, reuse and repair capabilities, which often employ, upskill and integrate workers who now get a chance to play an important role in their community.

→ On average, zero waste creates 10 times more jobs than landfilling or incineration⁴. Why is that?

- ◆ Landfilling and incineration are technology and capital-intensive waste treatment solutions, which require less labour than any other waste management operation.
- ◆ Increasing the capabilities of communities to re-use and repair materials facilitates work and employment through labour intensive repair systems and the deployment of re-use systems, such as Deposit Return Schemes, which create local jobs in collection and washing.
- ◆ Recycling is also labour intensive because the separate collection of materials creates an expectation for clean waste streams, which require a high degree of human coordination and postprocessing.

→ Zero waste brings the community together. For example, community composting, repair cafés, cooking with food discarded by supermarkets, to name just a few, are all zero waste activities which help bring the community together and build its resilience as a collective unit.

3. Protecting our environment and our health

Current distribution chains, that are global and interconnected, facilitate the spread of viruses and other pathogens at a speed we have never seen before. The COVID-19 pandemic is a good example of what can await us in the future if we continue to run a throw-away economy in which most stuff is disposable and shipped around the globe.

From a system in which we have no traceability as to whether the disposable packaging we are served with is safe, the zero waste approach helps society and economies transition to a system in which there is full transparency and suppliers guarantee the quality of the products and packaging.

Zero waste policies radically reduce plastic pollution and its associated environmental and health impacts. By promoting the zero waste lifestyle we support seasonal food produced in the community which needs less preservatives and packaging, consequently encouraging healthier habits.

Thanks to the economic incentives of zero waste systems such as Deposit and Return Schemes (DRS) and other reverse logistics operations, littering has been radically reduced, resulting in cleaner nature and parks. At the same time zero waste systems

⁴ RREUSE, 2015: Briefing on job creation potential in the re-use sector



that are based on refillable or reusable packaging often result in some of the cleanest products in the market, with increased capacity and focus given to washing and sterilisation.

Today, climate change poses one of the most urgent problems to humanity and the Earth as a whole. The accelerating warming of our planet and the increasingly devastating impact this will have on communities is occurring due to rising greenhouse gas (GhG) emissions of predominantly carbon dioxide, methane and nitrous oxide. Zero waste means fewer emissions from landfills and incinerators at the bottom and fewer emissions by working on prevention and better design. For example, the creation of energy from burning waste has been proven to be both hugely energy-intensive and inefficient, while improper landfilling facilitates vast amounts of methane and carbon dioxide emissions.⁵ Therefore, by adopting a zero waste approach to remove the need for such disposal, we can address a key part of effective climate change mitigation plans for cities and communities.

Simultaneously, policies that preserve the value of materials and resources within a circular economy also significantly reduce GhG emissions earlier in a product's lifecycle, before it becomes waste, by removing the need for the extraction and refinement of fossil fuels to manufacture and produce a good or material.

Finally, through home and community composting programmes less waste needs to be transported outside town and the compost can also be used locally. With less transportation its associated emissions are also reduced.

⁵ ZWE, 2019: <https://zerowasteurope.eu/library/the-impact-of-waste-to-energy-incineration-on-climate>



SOLUTIONS INCLUDE:	HOW ZERO WASTE CAN BE BENEFICIAL?
 Waste prevention and reduction	 GOOD FOR THE ECONOMY as it's cost efficient and it creates jobs at the local level
 Redesign of products	
 Reuse of products and packaging	 GOOD FOR SOCIETY as it's healthy and empowers local communities
 Recycling	
 Composting	 GOOD FOR THE CLIMATE & THE ENVIRONMENT as it's reduces toxics and GhG emissions
 Extended producer responsibility	
 Consumption habits transformation	
 Community empowerment	 GOOD FOR THE POST COVID RECOVERY as it's build more resilient and sustainable future

Zero Waste Circular Economy: a solid investment for Sustainable Finance (ZWE, 2020)

Introducing the Zero Waste Cities Savings Calculator

Do you want to be able to see the benefits that adopting a zero waste strategy could bring to a municipality in terms of saving costs and GhG emissions?

By switching to a zero waste strategy, municipalities can immediately begin reducing the costs of their waste management. The Zero Waste Cities savings calculator, created by Ekologi brez meja has been designed to help you visualise and understand the benefits that adopting zero waste policies can bring to your local area. [Try the Zero Waste Savings Calculator here!](#)⁶

All is required is that you input some simple information regarding your city or town's population and the ambition of its current plans to go zero waste, as well as key data on current waste generation and management levels, including costs. The calculator will then automatically showcase the potential cost savings for your municipality, providing a real life comparison example with cities in Europe. It works reliably only for countries with similar purchasing power, but is nonetheless a good demonstration how small improvements can add up.

⁶ EBM, ZWE, HD, 2020: <https://zerowastecities.eu/academy/savings-calculator>



3 THE CONTEXT OF WASTE MANAGEMENT IN THE MEDITERRANEAN

A INTRODUCTION AND OVERVIEW

The Mediterranean sea is the largest enclosed sea in the world and surrounded by 22 countries, which together share a coastline of 46.000 km. Being one of the world's busiest shipping routes it is home to around 480 million people living across three continents: Africa, Asia and Europe⁷.

Approximately one-third of the Mediterranean population is concentrated along its coastal regions, where environmental pressures have increased over the past decades. For example, by the year 2025 it is estimated that 72 % of the population in the region will be living in urban areas⁸. Significant increases in population and the subsequent increase in solid waste generation makes the subject of waste management particularly important in this region. If not properly managed, waste can result in intensified greenhouse gas (GhG) emissions, environmental degradation, marine litter, loss of biodiversity, air pollution and some of the related negative effects on public health.

Municipal solid waste production per capita in the Mediterranean region has risen by 15 % over the last 10 years and it is estimated to reach almost 135 million by 2025. The amount of waste generated in coastal regions (294 kg per capita) is further higher than the national average (272 kg per capita)⁹.

The most common disposal methods in the region are burning and landfilling in (usually) unmanaged dumpsites. Less than 10 % goes through a recycling process¹⁰, while the EU is targeting a 60 % recycling rate of household waste by 2030. For example in 2014, Algerian waste processing contained 60 to 65 % of discharging by landfill, 30 to 35 % of burying, 7 % of recycling and 1 % of composting¹¹.

Furthermore in Turkey, the traditional method for disposing of municipal solid waste has been open dumping, representing 35,5 % of treated municipal solid waste in 2014, whereas 63,6 % of the treated municipal solid waste was disposed of at sanitary landfills and reported recycling rates were very low¹². If we add the problem with

⁷ EEA, 2015: <https://www.eea.europa.eu/soer/2015/countries/mediterranean>

⁸ ARLEM, 2014: <https://cor.europa.eu/Documents/Migrated/news/rapport-sudev-dechets-2014-en.pdf>

⁹ EEA, 2014: <https://www.eea.europa.eu/publications/horizon-2020-mediterranean-report/file>

¹⁰ Ibid.

¹¹ Global Recycling, 2019: <https://global-recycling.info/archives/2620>

¹² Eionet Portal, 2016: https://eionet.europa.eu/etcs/etc-wmge/products/other-products/docs/turkey_msw_2016.pdf



the lack of sanitation measures in the dumping process and the proximity to city limits and waterfronts, the risk of disease, litter and pollution is increased by these conditions. These major concerns are calling for more sustainable waste disposal methods.

However, the complexity of describing the Mediterranean region as a homogenous entity is shown most evidently when we also examine some of the good waste management practices that exist regionally. For example, according to 2018 data, the top 4 provinces in Italy have a separate collection rate of above 80 %.¹³ Across Italy, it is becoming increasingly common for municipalities to be producing 50 kg of residual waste per capita, with results below 100 kg per capita widespread – around a quarter of municipalities achieved that in 2018. Furthermore, the top 10 performing municipalities with a population of over 15.000 all separately collect between 86 and 90 % of waste, resulting in residual waste per capita between only 35 and 53 kg.¹⁴

Further into this report, we have highlighted some best practice examples from Mediterranean municipalities that showcase the ability of regional authorities to design, implement and optimise effective recycling and waste reduction strategies.

Waste management challenges

The region is going through intensive demographic, social, cultural, economic and environmental changes. Rapid population growth, especially in urban areas, increases the demand for resources and land use change. These pressures are further amplified by the development of tourism and rapidly evolving consumption patterns from growing living standards.

The extent of the region's urban solid waste problem is influenced by:

- an absence of waste collection and disposal schemes,
- an absence of proper recycling facilities and a local secondary material market,
- improperly managed dumping sites,
- low public awareness about how and why waste should be prevented,
- weakly enforced environmental and municipal solid waste legislation
- an absence of waste reduction policies, with too much focus on treatment or recycling,
- many informal actors and activities within the solid waste management system,
- strong regional disparities between urban and rural areas that prohibit effective implementation of waste management strategies,
- a continued lack of meaningful and accurate data relating to waste generation, treatment and the composition of waste.

¹³ Catasto Nazionale Rifiuti: <https://www.catasto-rifiuti.isprambiente.it> (Rifiuti Urbani)

¹⁴ Ibid.



Becoming increasingly open to international trade and tourism is also reflected in the constant economic growth in the region, resulting in increasingly worrying trends in the composition of waste. Imported products are causing new waste streams such as hazardous electronics being dumped without any sorting or treatment, and a proliferation of packaging waste. On the other hand, positively, organic waste still has the biggest share of municipal solid waste, ranging from 40 % in Israel to 68 % in Tunisia, as compared with 20 % to 25 % in developed countries.

The Mediterranean region has been identified as one of the main climate change hotspots, facing important issues of water stress, extreme climate events and reliance on climate-sensitive agriculture. But compared to other areas in the world, the region itself emits low levels of GHG emissions¹⁵. Regional authorities therefore need to recognise the significant climate and non-climate related benefits and opportunities that waste prevention and recycling provide.

B A BRIEF ANALYSIS OF THE SPECIFIC NEEDS OF THE MEDITERRANEAN COASTLINE (*WITH SPECIAL ATTENTION TO SOUTHERN AND EASTERN MEDITERRANEAN*)

Countries: Cyprus, Greece, Turkey, Syria, Lebanon, Palestine, Jordan, Israel, Egypt, Libya, Tunisia, Algeria and Morocco.

The region of MENA (Middle East and North Africa) generated 129 million tonnes of waste in 2016, at an average of 0,81 kg per person per day while the waste generation rate in cities is significantly higher, at an average of 1,38 kg per person per day¹⁶. The region has a relatively low population size of 437 million (as of 2016) and subsequently the volume of waste generated regionally is relatively modest, compared to global trends, due to varying income levels and resulting consumption patterns. However, the population size is set to double by 2050, thus showing an urgent need to establish effective waste management and prevention systems.

The predominant type of waste in the MENA region is organic and green waste (58 %). In urban areas on average 90 % of waste is being collected where the predominant method is door-to-door pickup by trucks. Source separation is not common within the region. Significant variation between countries is more visible in the rural coverage, where on average 74 % of waste is collected. For example in Egypt, 15 % of rural waste is collected, mainly by informal active waste pickers. On the other hand in Turkey 90 % of the total generated municipal solid waste was collected in

¹⁵ EEA, 2015: <https://www.eea.europa.eu/soer/2015/countries/mediterranean>

¹⁶ World Bank, 2018: <https://openknowledge.worldbank.org/handle/10986/30317>



2014¹⁷. The percentage of municipal solid waste disposed of in sanitary landfills in Morocco has increased from 10 % in 2008 to 53 % in 2016, and the rate is expected to reach 80 % shortly, demonstrating fast improvement is possible¹⁸.

Collection of municipal waste can be a very challenging business and is affected by a variety of negative factors. These include high temperatures, underdevelopment, poor infrastructure, inadequate budgets, weak legislations, political instability, lack of political will and little investment into long term sustainable systems. Private investments into modern waste collection systems have helped, but overall still very little waste is treated, even the most easily recoverable waste types.

The private sector is involved in both municipal solid waste collection and disposal, which is either funded by local governments or the revenue from disposal. For example, in Morocco waste is collected by two private contractors, while governments have started implementing recycling plans. The country aims to increase the recycling rate to 20 % by 2022¹⁹. In Algeria, waste infrastructure is financed by the central government, while management of waste collection and disposal is financed by the junk removal tax, meaning that each household has to pay a fee to the municipality regardless of how much waste is generated.

As a solution to the waste crisis some countries have introduced bans on the use of plastic bags. Africa actually has the largest number of countries, 34 as of 2019, with limits or bans on the production and use of plastic bags.

Marine litter and biodiversity protection

Increasing plastic consumption and the cost of inaction to mitigate the flow of plastic (and other waste) into the ocean, is likely to negatively impact coastal economies. According to WWF²⁰, all Mediterranean countries had underperformed in managing plastic pollution. It is estimated that 229.000 tonnes of plastic is leaked into the Mediterranean Sea every year²¹.

The biggest overall threat are microplastics (particles smaller than 5 mm) which have accumulated in the Mediterranean Sea and are causing long-term damage to marine ecosystems and biodiversity. IUCN highlighted Egypt as the biggest source of plastic leakage, followed by Italy and Turkey, mainly due to high quantities of mismanaged waste and large coastal populations. Additionally the report stresses that bans can be effective interventions if widely implemented – for instance, it estimates that a

¹⁷ Eionet Portal, 2016: https://eionet.europa.eu/etcs/etc-wmge/products/other-products/docs/turkey_msw_2016.pdf

¹⁸ World Bank, 2018: <https://openknowledge.worldbank.org/handle/10986/30317>

¹⁹ Global Recycling, 2019: <https://global-recycling.info/archives/2620>

²⁰ BBC, 2019: <https://bbc.com/news/world-48554480> (Mediterranean plastic pollution hotspots)

²¹ IUCN, 2020: <https://iucn.org/news/marine-and-polar/202010/over-200000-tonnes-plastic-leaking-mediterranean-each-year-iucn-report>



ban on plastic bags in the basin would further reduce plastic leakage by around 50.000 tonnes per year.

Improving waste management, starting with waste collection, has been recognized as a priority under the Barcelona Convention and within the Union of the Mediterranean. It is the first regional sea adopting legally binding measures for marine litter management²².

Economic cost of marine pollution is estimated at €641 millions each year by WWF. Although the Mediterranean Sea represents less than 1 % of the global ocean area, it contains between 4 % and 18 % of all marine species. Many fishing species are threatened by a range of human activities, such as discharges of excess nutrients and toxic substances, littering, overfishing, and degradation of critical habitats.

However, today only 1,27 % of the Mediterranean Sea is effectively protected²³ and mainly in its northern part. Thus, political leaders within the region must make biodiversity protection a top priority. This is very much connected to the need for sustainable waste management. Not only will it improve well-being and tourism potential, but also create new income sources through, for example, composting, recycling, green energy generation and sanitation.

C REFUGEE INFLUX AND TOURISM

Tourism and mass migrations have been recognized by MED-InA project partners as significant contributors to waste-related pollution and management challenges. The following section presents only a brief overview and some good practice examples since these topics either deserve their own detailed guidebooks or require case-by-case deliberation. In particular, a more circular tourism is a topic of many initiatives and projects. For example, INTHERWASTE provides its own library of case studies²⁴ and good practices linking tourism and waste specifically in heritage cities.

1. Refugee influx impact on waste management

Mass migrations have similar effects on host environments as overpopulation. New camps are built on the outskirts of cities or in desolate areas to provide shelter to refugees. Large camps accelerate land degradation and affect the social, political and environmental aspects of the region. A lack of adequate planning and anticipation is common.

²² EEA, 2014: <https://eea.europa.eu/publications/horizon-2020-mediterranean-report/file>

²³ WWF, 2019: https://wwfmmi.org/newsroom/latest_news/?uNewsID=356339 (Mediterranean countries fail to protect their sea while biodiversity declines at unprecedented rate)

²⁴ INTHERWASTE: <https://www.interregeurope.eu/intherwaste/case-studies/>



Migration related spikes in waste generation bring many challenges and exacerbate pre-existing pressures on waste management. There is a notable increase in heavily packaged goods and waste, mainly in plastics and metal. Authorities responsible for collection and disposal might have already been underfunded or under-resourced. Consequently, many NGOs helping with water supply, sanitation and hygiene promotion often take the responsibility of managing solid waste as well. Often a quick solution for waste disposal is burning or burying the waste in an uncontrolled manner nearby, which is hazardous to the environment and public health.

Among all other challenges, refugees have very limited opportunities to support themselves, so integration in the refugee and hosting community is very important. Participation in recycling projects²⁵, such as one in Zaatari, one of the biggest camps in the north of Jordan and home to almost 80.000 Syrian refugees²⁶, has been very beneficial in introducing and involving refugees into waste management.

Greece on the other hand has been confronted with enormous amounts of waste from life jackets and rubber dinghies used to cross the sea, which is posing a massive challenge to their islands²⁷. This waste cannot be recycled in Greece. Sustainable waste management for new populations is key to maintaining adequate and hygienic living standards and ensuring environmental and health impacts on the host community are minimal. Unfortunately, there are no good quick fixes, and systems to tackle the issue comprehensively are yet to be developed.

2. How does tourism affect the waste generation?

The Mediterranean is one of the most popular tourist destinations in the world, owing its success to attractive landscapes and rich biodiversity, cultural heritage and traditional lifestyles, coupled with a favourably mild climate, beaches and clear seawater. Since 1995, tourism in the Mediterranean has grown by almost 75 %. Projections show that the number of arrivals is expected to continue growing, and could reach 637 million by 2025²⁸. The COVID-19 pandemic will have caused only a temporary decline and growth is expected to return as travelling bans are lifted. This downtime period presents a fine opportunity to improve resource management and implement waste prevention plans without the pressure of the high season.

Tourism is the main economic driver of many Mediterranean regions and cities, particularly for those with limited industrial or agricultural development. Touristic

²⁵ OXFAM, 2017: <https://oxfam.org/en/research/trash-talk-turning-waste-work-jordans-zaatari-refugee-camp>

²⁶ UNHCR, 2020: <https://reporting.unhcr.org/jordan> (Jordan Zaatari Refugee Camp Fact Sheet - August 2020)

²⁷ Kounani, Skanavis, 2018: <https://researchgate.net/publication> (Refugee crisis: Greek residents' attitudes towards waste management in their region)

²⁸ EEA, 2014: <https://eea.europa.eu/publications/horizon-2020-mediterranean-report/file>



activities are predominantly concentrated in the coastal areas and peak during the summer season. In some areas, more than 75 % of annual waste production is generated in that period of the year and the amount of plastic waste increases by 40 %. Concentrated tourism also brings discharges of untreated wastewater and the over-exploitation of natural resources. More tourists, greater the impacts. Thus, it is very important to keep a two-way relationship between the impact of tourism on the environment and the impact of environmental quality on tourism potential. The cleanliness of these destinations is an essential requirement to maximizing positive impacts of tourism on the overall economic development in the region.

Many Mediterranean municipalities are lacking the financial and technical means to ensure sustainable waste management in tourist areas and need wider stakeholder support to succeed. Increased collaboration and upskilling could have a tremendous impact on waste prevention at the source. Furthermore, implementing extended producer responsibility schemes to take charge of the organization and financing of packaging disposal and recycling is a good way to unburden local authorities.

For waste results, it is not obvious how tourists and locals compare. In the case of Menorca island in Spain, it was estimated that, on average, one more tourist generates 1.31 kg/day while one more resident generates 1.48 kg/day²⁹. When it comes to separate collection though, one resident collects on average 47 % more waste than one tourist. Better data can help in the planning of waste infrastructure and waste collection services in tourist areas.

Despite the challenges that tourism poses, in February 2019 the Government of the Balearic Islands adopted a pioneering law on waste prevention containing various measures and targets aiming to solve the islands' waste issue. As a result of being a top tourist destination, the islands have the highest waste generation levels in Spain – 763 kg per inhabitant in 2018 compared to the country average of 475 kg³⁰.

The primary objective of this law is to tackle the issue of waste generation in the Islands through a combination of prevention and improved recycling. It aims to boost prevention and reuse through specific measures and targets. The law also aims to tackle the most problematic and visible waste streams, such as single-use items, plastic packaging, and food waste. Through the revision of extended producers responsibility schemes, further pressure is put on producers to fully support the transition.

²⁹ PubMed, 2013: <https://pubmed.ncbi.nlm.nih.gov/24001553> (The impact of tourism on MSW generation: The case of Menorca Island (Spain))

³⁰ ZWE, 2020: https://zerowasteurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_balearicislands_waste-prevention_en.pdf



The law offers a comprehensive approach to waste pollution. It includes:

- Binding waste reduction targets: 10 % by 2021 and 20 % by 2030.
- A binding food waste reduction target of 50 % by 2030.
- The prohibition of several SUP items (straws, cutlery, lighters).
- The implementation of an extended producer responsibility system that includes full cost coverage for packaging, even non-sorted, and clean-ups.

The law came into force in February 2019, but authorities and companies were given 2 years to adapt. However, due to the COVID-19 crisis, the period to adopt the measures has been extended by three months. Although some stakeholders – such as hotel and restaurants chains, municipalities, and companies – have already introduced changes to comply with the law (for example, Estrella Damm has replaced the plastic rings of can packaging with cardboard options), this has been done on a voluntary basis. As a result, there is no quantitative data on the impact of this law yet in terms of waste prevention, reuse, or separate collection.

Whilst not a municipality or city, the law implemented by the Balearic Islands is a best practice that should be highlighted due to its binding prevention targets, as well as its prohibition of several items that are most commonly found on beaches and in residual waste bins. The regional government's decision to adopt this law shows that sub-national authorities can take ambitious action to reduce waste whilst continuing to help the local economy prosper.



4 CASE STUDIES

A EUROPEAN

Europe is full of good practice examples of municipalities adopting zero waste policies and achieving success. A seaside town, a province and an island are worth mentioning and while one isn't on the Mediterranean shore, they share many key characteristics. All started with poorly developed infrastructure and waste management systems. And all were stirred by their poor results to successfully take ambitious action.

Argentona is a small Catalan town of 12.000 inhabitants that until 2004 burned most of its waste. As the incinerator capacities were getting filled to the brim, the town rethought their approach to waste management and became one of the first Spanish towns to implement a zero waste approach. They managed to more than **double their recycling rate** by 2012, **reduce the amount of municipal waste by 15 %** and both reduce costs and create new jobs while doing it. Read more about Argentona's journey in a [dedicated case study](#)³¹.



Pontevedra may be on the Atlantic coast of Spain, but it too had a rough start with only 9 % of municipal waste separately collected as recently as 2017. The province which houses almost a million people in 61 municipalities spread over a larger area is not ideal for centralized waste management solutions. To comply with EU recycling targets, the province started a decentralized community-led composting system to revolutionize the way they manage biowaste. In a few years they managed to **increase the composted amounts twenty-fold** while lowering the costs – local composting is 2-3 times cheaper than incineration. Some municipalities in the province rely completely on home and community composting, not collecting biowaste at all. 2019 data from Pontevedra shows that the waste management costs go up initially when implementing this system, due to both systems being transitionally in place. However, **when organic waste capture rates go above 40 %**, the costs associated with the new local composting system start to go down. Their data shows that **costs go down quite rapidly** until capture rates reach 75 %, after which it tapers off. Read the details in a [dedicated case study](#)³².

³¹ ZWE, 2018: <https://zerowastecities.eu/bestpractice/best-practice-the-story-of-argentona>

³² ZWE, 2019: <https://zerowastecities.eu/bestpractice/the-story-of-pontevedra>



The island of **Sardinia** used to be the least performant region of Italy, with a separate collection rate of **only 3,8 %** in 2000. Today, thanks to a progressive waste management programme, it is **the best performing island** in the Mediterranean. Sardinia managed to increase its separation rate into the sixties by 2016 and decrease the amount of generated municipal waste. Both through adopting mandatory separate collection of organic waste, promoting home composting, door to door collection and using individual (PAYT) and regional level economic incentives. Read more about the gradual success in a [dedicated case study](#)³³.

Zero Waste Europe regularly publishes new case studies, so be sure to check out their [Zero Waste Academy](#)³⁴.

B NON-EUROPEAN

Beit Mery is a city of around 13.000 inhabitants only 15 km from Beirut and where the first Lebanese zero waste facility started in 2016. The approach was developed as a solution to the garbage crisis of 2015, when the biggest landfill Neemah was closed and there were no disposal alternatives. The Zero waste facility has been managed by Cedar Environmental, a Lebanese environmental and industrial engineering company that Beit Mery has contracted for its zero waste services³⁵. They believe waste can be managed locally without a need to build or import expensive and harmful incinerators. The main objective of the project is to eliminate the municipal landfill waste which would rather be recycled or composted within a non-centralized system in collaboration with municipalities.



³³ ZWE, 2018: <https://zerowastecities.eu/bestpractice/the-story-of-sardinia>

³⁴ ZWE: <https://zerowastecities.eu/>

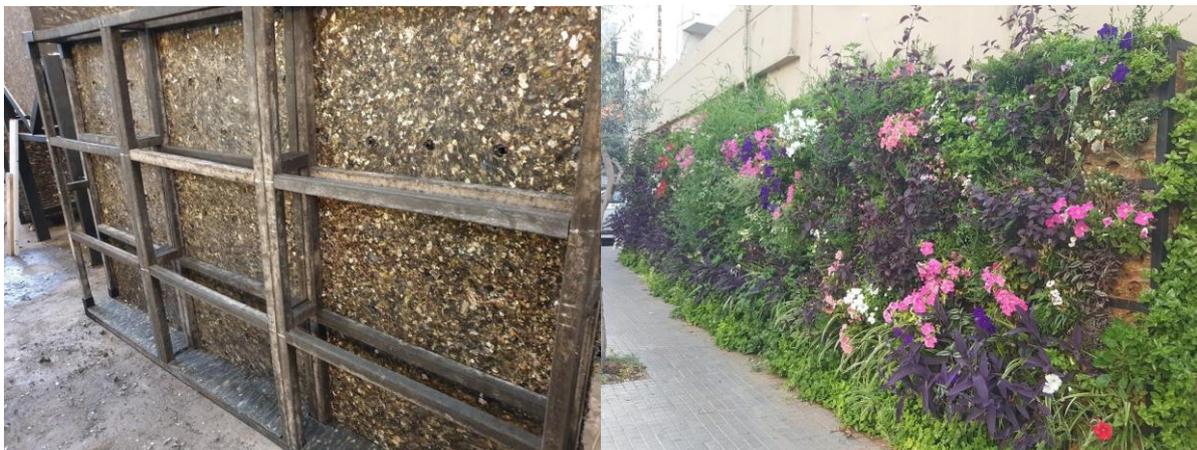
³⁵ E. Azzi, 2017: <https://kth.diva-portal.org/smash/get/diva2:1139992/FULLTEXT01.pdf> (Waste management systems in Lebanon -The benefits of a waste crisis for improvement of practices)



Sorting line at Beit Mery's zero waste facility (Photo: Ziad Abichaker)

Beit Mery's facility only processes municipal solid waste. The facility consists of 3 working units: sorting, composting and a sorted materials volume reduction unit. Collection is done with mini trucks without compaction. The facility has an assembly line where the waste is sorted between organic and non-organic waste such as plastic, two kinds of glass, paper, tins, textiles, and electronic waste. On average 78 % of the waste is compostable and using aerobic composting is key for a successful waste management plan in cases with such a high level of organics. Beit Mery's zero waste facility is proof that you can produce **good quality compost** from household waste also in the Middle East.

One of the outputs of the recycling process is 'ecoboards', a durable building material made from inert materials (mostly LDPE), used to make vertical green walls or street recycling bins. It is a good example of how circularity can be improved locally. Over a 3 year period of consecutive operation of the facility, the average incoming weight per month was 458 tonnes³⁶, which would be otherwise disposed of in a landfill. Thus the system creates more jobs while putting materials back into the economy. It is also **around 50 % cheaper** than the city's previous contract – the city now pays just \$62 per ton, as opposed to \$130³⁷.



Ecoboards used to make vertical green walls (Photo: Ziad Abichaker)

The Beit Mery case shows that waste is a material that Lebanon has the industrial infrastructure to recycle and that **there is a way to avoid burning and landfilling**. It requires collaboration between different industries, but this system is able to extract valuable resources at low public health, environmental and financial costs.

³⁶ Z.Abichaker, 2020: <https://linkedin.com/pulse/1300-days-consecutive-operations-beit-merys-facility-ziad-abichaker>

³⁷ Deutsche Welle, 2016: <https://dw.com/en/trash-crisis-forces-lebanons-environmental-awakening>



Part 2:

Designing a local zero waste strategy



5 10 QUESTIONS TO GET YOU STARTED

Often starting the process of designing a zero waste strategy can be the hardest part. It can seem daunting, with an enormous volume of material online, but little specific guidance for how to begin your journey to zero waste in your context.

This is why we have designed this section, to help provide some of the key questions that zero waste experts typically ask at the beginning of the design process for local zero waste strategies. These questions provide a good overview of the framework your zero waste strategy should have. Your answers to these 10 questions, using the data and information readily available, should be used to help begin formulating the design of your local zero waste strategy and help identify where policies/solutions are needed first.

1. Waste Generation

- How much waste is generated by the population living within your municipality? Ensure to have the full amount, but also it is key to break this down further into an average generation volume per person per year.

2. Responsibilities

- What is your municipality responsible for in terms of waste management?
- What competencies and powers does your municipality have to change and improve the local waste management infrastructure?

3. Waste Composition

- What is the composition (content) of a typical household or business residual waste bin within your municipality?
- How much of it is recyclable materials and which ones? How much of it is organic waste?
- Regular analysis of the residual waste composition is an incredibly important policy to help identify policies & solutions for optimizing the waste management system.

4. Separate Collection

- How do citizens and businesses separate their waste and recyclables currently?
- What is the volume of separately collected materials and what percentage in terms of the overall waste generation?



- What happens currently to the recyclable materials once collected? Is there data available on the volume of materials that are recycled?
- What contracts do you have with local recycling companies? Can these be changed, improved or strengthened?

5. Organic Waste Management

- Is there a high volume of food or garden waste generated by residents and businesses?
- Is food and or garden waste separately collected?
- What is the level of contamination (the percentage of non-compostable materials collected within the organic waste)?
- Does your municipality own a composting plant or is there one regionally?
- Do local residents and businesses have the capacity to compost at home or in the community?
- Does your municipality have the power to introduce measures that encourage and support greater composting either at home or in the community?

6. Waste Prevention

- Does your municipality have a strategy for further measures to reduce and prevent waste?
- What powers does your municipality have to introduce waste prevention measures within public areas? Have you looked at ways to prevent waste within your public procurement policies?
- Does your municipality have the competency to ban certain products or materials in the market (e.g. plastic bags)?
- What local stakeholders could you work with to identify and implement further waste prevention measures?

7. Repair and Reuse

- How many facilities currently exist within your municipality that help repair unwanted items?
- How many businesses currently operate a business model that uses repaired, second-hand items?
- Is there local expertise (construction, carpentry, mechanics etc.) that could be utilized to help establish local repair and reuse centres?

8. Contractual obligations



- Does your municipality have a contract with the waste disposal facility, or is this the responsibility of the region or another authority?
- If so, when does the contract expire? Does it obligate you to provide fixed quantities of waste?

9. Disposal costs

- How much does your municipality have to pay in fees or taxes for disposing of mixed waste? Does the municipality have the power to amend or challenge this price?
- What is the waste management cost per capita?
- Does your national law charge extra taxes for landfilling or incineration?

10. Seasonal effects on waste volume

- Does the volume of waste generated within your municipality change greatly depending on the time of year? For example, do you receive a high level of tourists during the summer or winter months?
- What is the average volume of waste generated during these months compared to the rest of the year?
- Who are the main contributors to this increase of waste amounts?



6 HOW TO DESIGN & IMPLEMENT A ZERO WASTE MUNICIPALITY PROGRAMME

A LAYING THE FOUNDATIONS FOR A SUCCESSFUL PROGRAMME

As the old saying goes, ‘fail to prepare and prepare to fail,’ and this is particularly important when it comes to zero waste programmes. Many policies can be implemented quite quickly by a municipality which can have a positive impact in a short space of time, for example **a reduction in the volume of residual waste by implementing an organics collection system.**

However, if a municipality is serious about ensuring the long-term impact and sustainability of their plans, then it will embed a number of key factors within the initial design of its zero waste strategy. We can identify three key actions that must be implemented at the start, which are crucial for embedding strength and longevity within a local zero waste programme:

- *Capturing and analysing the most up to date available data regarding the local waste management system and context;*
- *Engaging the community meaningfully to ensure they feel part of the zero waste journey;*
- *Setting of quantitative goals in the short, mid and long term, from which a roadmap for implementation can be created.*

Firstly, as mentioned in the ‘questions to get you started’ section, it is imperative that a municipality conducts an analysis of the current situation as one of their first actions within this process. A situational assessment should capture data and information regarding the entire waste management, as well as the wider context that affects citizens’ and businesses’ ability to reduce their waste. For example, this includes both a residual waste assessment (which we will focus on later in this section) and a broader situational analysis. This second analysis should embed some of the questions posed in the chapter above, examining both what policies and actions the municipality can implement themselves as well as the key stakeholders that generate waste and therefore should be included in the discussions.

Furthermore, in order to effectively measure future progress, it is critically important that a baseline set of data is created. At a minimum, the municipality should capture the current levels of waste generation per capita both for total municipal solid waste and residual waste, as well as the volume of waste that is separately collected and/or recycled. This should all be data from the most recent full year. These 2 key metrics can therefore become the key performance indicators, specifically waste generated per capita, as this will indicate whether a community



is reducing the total volume of waste it generates and therefore heading towards a circular economy. Further indicators are encouraged to be created and data subsequently captured that form the foundation of a zero waste programme. These include the number of zero waste initiatives implemented locally, number of waste streams that recycling options are made available for, the number of collection/drop-off opportunities, the number of citizens engaging in zero waste measures, number of composting facilities operating at home and in the community, to name just a few...

Secondly, to ensure that the foundations for a successful zero waste programme are in place, a municipality must build in meaningful opportunities for the local community to engage in the design process. Households and businesses that are told what they must do, rather than consulted, are much less likely to remain supportive and engaged in a project. At the same time, zero waste programmes and policies that have meaningfully engaged the key stakeholders (those who will use, benefit from or have to change their behaviour because of the new policy) are much more likely to be impactful and effective.

Creating opportunities for residents, businesses and other key institutions within the community to understand what the local zero waste strategy could mean for them, why it is important and ensuring they have an opportunity to feedback is imperative for a successful strategy. For example, a municipality could design an expensive high-tech Pay-As-You-Throw system for household waste. Yet if the system does not account for existing local behaviours on waste separation and disposal that will only be discovered or realized via conversations with residents, then the system is destined to be ineffective from the start.

Finally, a successful zero waste programme is one that is spearheaded by clear goals and targets to work towards. Once the first two steps have been taken, when a situational analysis has been conducted with data on current waste levels captured, and quality feedback has been received and taken into account from local stakeholders, the municipality should set ambitious zero waste goals that set the tone and vision for the zero waste plan as a whole.

These targets should focus on the key indicators mentioned above – a reduction in the volumes of residual waste and of the total waste generated, per capita.

Setting a target to reduce the volume of residual and total municipal waste generated by a specific year should be the most visible aspect of a local zero waste programme. However, success will occur most often when this overall goal is backed up by clear goals and objectives in the short and medium term. Goals for reducing waste or increasing community engagement for example within the next 2, 5 or 8 years are key for providing a framework from which a detailed roadmap for



implementation can be created. Having clear objectives and indicators to measure success, as with all of the actions mentioned in this section, will require a greater investment of time at the start of the process. However, if the right vision and procedures are embedded within the zero waste programme from the outset, then the likelihood of success is much higher. With access to data, meaningful opportunities for the community to review and feedback on the plan, and clearly defined goals throughout, a local zero waste programme has built the necessary foundations for its success in the short, mid and long term, regardless of ruling party change. Treating the zero waste journey just as a quick decree is a sure way to fail, which has happened before, so the process now includes several safeguards.

Best practice example

The City of Kiel became the first German city to commit to zero waste in late 2018. After setting this goal, the City started a 2 year process to analyse the current situation, identify both existing zero waste initiatives locally and good policies from around the world, before organising a set of workshops for the local community to co-design the strategy. In total, 72 existing zero waste activities were identified within the city. 134 foreign good zero waste practices were identified as potentially relevant and replicable, whilst 6 workshops were held with 450 Kiel inhabitants. The workshops resulted in 664 ideas being created for how the community and city can jointly implement its [zero waste plan](#)³⁸.

B WASTE PREVENTION MEASURES, SPECIFICALLY PLASTIC

Waste prevention is the ultimate goal of any zero waste strategy, yet also one of the most challenging aspects for communities to tackle. Unlike waste management improvement, waste generation and prevention are more tightly coupled with external factors out of significant local control. However, that does not mean nothing can or should be done. Not only have numerous communities from around the world implemented successful waste prevention programmes, but in some cases they managed to affect the wider limiting frame they have had to operate in.

Plastic has become ubiquitous and its rise has largely been due to unfettered proliferation of **single-use items and packaging**. They constitute more than 59 % of plastic waste³⁹, so there is no question what plastic waste prevention programmes should primarily target. Other household sources only account for an additional 4 % of plastic waste, while the majority of the remainder can be attributed to longer-term uses in construction, the automotive sector and electronics⁴⁰.

³⁸ Kiel, 2020: https://www.kiel.de/de/umwelt_verkehr/zerowaste/

³⁹ EC, 2018: <https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>

⁴⁰ Ibid.



Municipalities should consider all levels at which to make prevention interventions and ideally devise complementing measures at all of them. At the highest level, policy and public perception improvements are two obvious choices.

Municipalities can show their intent to upgrade their approach to waste is serious through public pledges like the *Plastic Free Community* marshalled by Surfers Against Sewage, formal zero waste commitments with targets⁴¹ and the *New Plastics Economy Global Commitment* by Ellen MacArthur Foundation. They can encourage the same in other parts of their communities through new local labels (or even certificates), public challenges and competitions.

Changing local policies is the most direct way to champion waste reduction, but the best municipalities don't stop there and advocate also for changes in limiting regional and/or national legislation.

New policies should show that the municipality believes in the change it is trying to achieve and that it will lead by example. Eg. by legislating **green public procurement** that takes waste generation, packaging, reuse and local sourcing into account, both for services and products (e.g. stationery, protocol gifts, office furniture); **waste reductive management of own events**; general **economic incentives** to produce less waste for both citizens and businesses (see below).

Improved communication, information sharing, education and awareness raising are also covered in a dedicated section, but their impact is not to be underestimated, even in the short term. Promoting reuse, rethinking, repair, refusal, refurbishment and all the other Rs is a good way to start building a community of inspired individuals that will take waste minimization as a worthy challenge and help multiply the effects of official efforts. In a similar vein, promoting gardening and other forms of increased food self-sufficiency will directly affect the amounts of plastic packaging waste and indirectly contribute to lowering of food waste amounts. Or throwbacks to the sometimes recent past when traditional shopping and sales produced orders of magnitude less packaging waste, or when using tap water was normal (if safe) and bottled water didn't exist. Another aspect of waste reduction through communication is covered in the section on new business models – municipalities are in the perfect position to encourage local businesses to innovate and help in reducing the amounts of (plastic) waste.

C EFFECTIVE ORGANIC WASTE MANAGEMENT

Organic waste accounts for the largest fraction of municipal solid waste (on average 40-50 %) and only a third is collected separately and properly recycled.

⁴¹ Zero Waste Europe will additionally be launching a formal certification scheme for municipal zero waste commitments in mid 2021



The number one priority to reduce residual waste is separate collection of organics (food and green waste). This can often have the biggest impact, with huge volumes of waste being sent for composting rather than landfill or incineration, saving money, while also resulting in other recyclables having a higher purity rate and thus preserving their value as materials to be sold, reused or recycled.

The most common way to separately collect organics is within an extensive door-to-door collection system. Collection should be fairly frequent, depending on the area and other city characteristics, while easy to use for the residents and for any waste pickers to access. Organic waste, due to its high density and high biological activity, cannot be stored for a long time before transfer and it does not make economic sense to ship it almost daily to big bio-waste treatment facilities. Hence local treatment of organics is the most economical and environmentally sensible option. Whether this takes place via home composting, community composting or anaerobic digestion, will depend on local conditions.

To shift to a decentralised, community-led composting system it is important to engage the locals in education, training and programmes to reduce food waste at source, and in the programme implementation itself. The French city **Besançon** and its surrounding municipalities proved it is possible and that extensive use of decentralized composting makes sense. They decided to start moving away from incineration towards more sustainable waste management. In 2016, they composted more than 7.400 tonnes of organic waste which led to saving around 800.000 € of waste management costs. Although the organic waste isn't separately collected, over 50 % of the citizens are composting their food scraps at home or in community composting sites (2016 data). This high participation is reflected in the presence of organic waste in residual waste that dropped from 67 kg per capita in 2009 to 36 kg in 2014 and has probably further decreased since. How it all started and what the reasons for their success are, can be read in [a dedicated case study](#)⁴².

The management of organic waste is particularly difficult for older cities that experience a large influx of tourists during holiday periods. The [SCOW project](#)⁴³ is a good example of how to develop low cost, technically simple and high quality organic waste collection systems in such circumstances, and it includes its own library of good practices.

D ECONOMIC AND SOCIAL INCENTIVES

Motivation for waste reduction matters. People feel more motivated when environmental benefits are combined with personal benefits, such as financial

⁴² ZWE, 2018: <https://zerowastecities.eu/bestpractice/besancon/>

⁴³ SCOW: <http://www.biowaste-scow.eu/About>



rewards, increased status or social connection. Economic incentives are a sure way to change the way we consume and produce things.

One of the economic incentives of zero waste systems is **Deposit Refund Schemes (DRS)** to encourage efficient collection of used products (e.g. cans and bottles) and avoid littering. Local DRS can also play a key role in behaviour change when consumers and businesses take responsibility for waste reduction through a system which enables a deposit scheme for reusable take-away items. Moreover, introducing economic incentives for packaging-free and reusable products and systems to overcome barriers to entry, such as subsidies (e.g. tax/price reduction) or taxation for single-use packaging placed in the market is necessary.

Another economic incentive for improving separation at the source of recyclable waste and for reduction of mixed waste is **Pay As You Throw (PAYT)** schemes that charge waste producers on the basis of the actual amount of waste generated.

An engaging social incentive is the **'Zero waste family' challenge** to promote responsible consumption patterns by supporting citizens in reducing their waste. Usually the families participating in the challenge are equipped with zero waste reusables and are guided by zero waste experts on their path to reduce household waste. These kinds of projects are enjoying strong public and media interest as they are closely presenting the zero waste lifestyle to the public.

→ [Learn how the Italian zero waste champion city Capannori helped reduce the average amount of residual waste from zero waste challenge families to just 3.8 kg per person per year, compared to the average of 88 kg.](#)⁴⁴

Additionally, **local support groups and public allies** for zero waste can help to transfer empowering information and reaffirm and sustain long-term commitment. As the local models change and people get more involved in the decision making, also their attitude towards waste change. For best results it is important not to leave anyone behind and include as wide an array of stakeholders as possible. From individuals, households, educational institutions to the hospitality and retail sectors, offices, media and other kinds of businesses. The more inclusive a city is, the more ambassadors and allies will organically emerge from the process.

Nudging has been used mostly in littering prevention actions. Bins that play a tune or thank the user when being "fed" are a hit with children, while an example of success for adults would be transparent split receptacles for cigarette butts, functioning as voting machines (eg. for competing football teams).

⁴⁴ ZWE, 2020: <https://zerowastecities.eu/the-story-of-zero-waste-cities/>





Waste collection need not be dull, EBM, 2019

With a waste reduction plan and the roll-out of financial and social incentives that are adapted to citizens and businesses, everyone benefits. When both businesses and citizens are financially incentivised to produce less waste, they will be able to lower the costs they previously paid for waste management. Social incentives are further giving a sense of belonging and sustaining the local economy.

E CREATING ZERO WASTE BUSINESS MODELS

In cities around the world, social entrepreneurs, visionary policy-makers, and innovative practitioners are showing that zero waste is a viable business strategy. In contrast to the primitive idea of burning or landfilling waste, zero waste solutions create more local jobs and save costs for both cities and businesses, as well as, of course, helping protect the environment and public health.

A zero waste, circular economy aims at keeping products and packaging in use for as long as possible, preventing them from ever becoming waste. For example, single-use plastic packaging in Europe loses 95 % of its value after the first use-cycle. Therefore, optimising the efficiency of traditional waste management systems is important but insufficient to truly transform the model of production and consumption towards a circular economy. New business models for both therefore



need to be scaled up and applied, **which is a role that municipalities can help facilitate and accelerate.**

Municipalities can and already are playing a critical role in supporting the development of new business models that design waste out of our systems and prioritise the upper tiers of the waste hierarchy. These models that do avoid waste and have circularity embedded within them, often follow a set of key trends:

Some zero waste businesses sell their service rather than their product. Most businesses today that are linear will sell a product, whereas zero waste business models are based upon selling the service of *using* a product, rather than just the product itself. These are common within a sharing economy but also affect waste generation. For example, these include deposit return schemes for refillable containers or coffee cups that can be used in a local network of businesses.

Zero waste business models prioritize the delivery of high-quality and long-lasting products. Materials are chosen and products designed with their durability, reparability and upgradability in mind. Ensuring that the product can be repaired, refurbished, remanufactured or remarketed is an essential added-value.

Zero waste business models provide greater transparency and traceability for a product after it has been designed. Currently, most businesses are not concerned with a product after it is sold, whereas a zero waste business model is designed to control and not lose track of the products it sells, so that they can be easily taken back for reuse or recycling.

Zero waste business models establish and facilitate greater collaboration and innovation along the entire supply chain. Through their design, zero waste businesses often form creative and innovative partnerships across ‘traditional’ sectors of the economy. Whether that is a joint process of assembling and disassembling products, utilising different networks for delivering and recovering items or using new technology and communication methods such as phone apps, zero waste business models challenge traditional thinking of business design to maximise the benefits from new collaborations and partnerships.

Best practice examples of different zero waste business models:

- [eReuse \(Catalonia\)](https://zerowasteurope.eu/2018/12/press-release-case-study-ereuse/)⁴⁵ is a perfect example of how symbiosis between the digital agenda and waste management can create value, sustainability and jobs. By connecting municipalities and other local institutions together with repair technicians via an online platform, eReuse helps expand the life of electronic devices. They also incorporate blockchain traceability technology to ensure each user can track the lifespan of the second-hand product they buy.

⁴⁵ ZWE, 2018: <https://zerowasteurope.eu/2018/12/press-release-case-study-ereuse/>



eReuse's results, creating 1 job for every 300 items reused and ensuring a 95 % recycling rate, showcase the economic, social and environmental benefits that zero waste business models can have.

- [Original Unverpackt](#)⁴⁶ (Germany) is a packaging free shop founded in Berlin, 2014, that eliminates unnecessary packaging waste, by offering products without single use wrapping. It also contributes to reduction of food waste, as customers can buy any quantity they need and pay by weight. Products are delivered in bulk to the store, where customers bring their own containers and pay by weight. Original Unverpackt also offers a wide range of containers to choose from, for those who forget to bring their own or are new to the concept. Customers living outside of Berlin can order products via the online store. At Original Unverpackt you can buy almost anything you would look for at a regular supermarket – its product selection includes basic groceries, such as bread, fruit, vegetables, and grains as well as less-common items like alcohol, sweets, organic cleaning products, bamboo toilet paper and toothbrushes.
- Deposit Return Schemes such as [ReCircle \(Switzerland and Germany\)](#)⁴⁷ which replaces over 50.000 single-use containers everyday through its 1.360 partners in Switzerland and in Germany. Partners include cities, schools, companies, meal services as well as cafes and restaurants. Each participating entity pays an annual subscription fee of 160 € for 20 reusable containers and cutlery. The deposit customers pay for each container is about 10 €, which is fully refunded after use.
- [Phenix \(France\)](#)⁴⁸ has saved 30.000 tonnes of products from the bin and distributed 60 million meals across France. A winning solution that effectively prevents waste, creates jobs and makes businesses and individuals save money while helping charities. The PHENIX Connect platform puts businesses having food surplus in contact with structures able to use this supply.
- The [Lavanda project](#)⁴⁹ established by the social cooperative ETA BETA (Bologna, Italy) seeks to promote the use of washable nappies (and masks) and bring parents closer to this ecological, economical, and healthy choice. For many municipalities, disposable nappies are one of the most common and problematic items, heavily contributing to the weight of residual waste. For example, statistics show that in 2017, around 33 billion single-use baby nappies were consumed across the EU, resulting in 6.731.000 tonnes of waste generated per year. The Lavanda project provides a collection and washing service of used cloth nappies to the local community, as well as delivering clean ones in return. In each of the following years up until 2020, the number

⁴⁶ <https://original-unverpackt.de/>

⁴⁷ <https://www.recircle.de/>

⁴⁸ ZWE, 2019: <https://zerowasteurope.eu/2019/06/the-story-of-phenix-a-recipe-to-effectively-enforce-food-waste-reduction-targets/>

⁴⁹ <https://www.etabeta.coop/lavanda/>



of nappies washed surpassed 21.700 units, reaching 35.792 in 2017 at its peak. The impact this has on local waste reduction is great, for example just in one year (2015), the project prevented 8.410 kg of nappies from being included in the residual waste.

Local municipalities have an important role to play in helping the transition to a society where reduce and reuse is more normal than single-use. Here, we outline **some key policy recommendations** for local authorities to implement that will help build an enabling framework for zero waste business models to thrive:

- Review public procurement standards to incorporate bans on single-use items, as well as introducing targets and incentives for reusables within all of a municipality's procurement services. Furthermore, the same policies can be applied to public events and spaces within the municipality's jurisdiction.
- Introduce incentives and ensure financial support for reusable items and systems to overcome barriers to entry, as well as financial penalties or taxes that encourage businesses to switch away from single-use items.
- Support the building of the necessary infrastructure for reuse systems to flourish locally, such as drop-off networks, return logistics, washing facilities, redistribution, item tracking and customer refunds.
- Run education and awareness training activities with the local community on the benefits of switching to reuse, including specific employee training for relevant businesses.

F ENGAGING AND COMMUNICATING WITH THE LOCAL COMMUNITY THROUGHOUT

Another key factor for successful implementation of zero waste strategy and to achieve sustainable outcomes is community education and participation. Community engagement enhances trust in the long-term commitment to solve addressed issues. Therefore, Zero waste takes a people-centric approach to change. Citizens should be invited to adopt waste-free practices, on top of having the opportunity to actively participate in the design of resource management systems that significantly reduce waste production.

Education and training are vital to shift the paradigm and progressively phase out waste. Key personnel from municipalities' environmental division, the local waste manager and other community leaders, need to ensure they increase their levels of awareness and knowledge regarding resource management. Further they can develop community understanding of the waste and resource recovery sector.



Zero waste challenges and programmes have proven to be an impactful tool which municipalities can use to raise awareness on the issue of waste. They should be designed to not only engage community members in an interactive manner, but also to help showcase the methods which individuals can reduce their waste.

Zero waste events, whether in a sporting or cultural context, provide great opportunities to engage a mass audience. They are also a great way to tackle waste generation, as often these events produce vast amounts of single-use non-recyclable waste. Municipalities should work with partners in their community to promote and communicate about zero waste solutions at these events, helping to bring about a change in the narrative and behaviour of citizens regarding their waste generation.



'My Zero Waste Sporting Event' - 12 actions to reduce in sporting events, 2019 by ZWF⁵⁰

Another important stakeholder group to target when engaging the community is schools, including both the students and staff. Schools are so important not only because they are hotspots for waste generation, but the impact of communications and education on zero waste can have a double effect. If you change the mind of a young student, you are also helping to change the mind and behaviour of their family back home. For all communications, but particularly in schools, innovative and fun methods need to be used to get your message across. Municipalities should get creative in the methods they use to engage stakeholders within their zero waste strategy, whether through creating competition within the community or celebrating local zero waste champions so that they become role-models.

'Les Héros du Zéro Déchet'⁵¹ is an illustrated booklet for children by Zero Waste France. It aims to make children aware of the impacts of waste on the environment and our health and presents 6 actions to move towards zero waste on a daily basis.

As we have discussed, the vast majority of local municipalities are the authority which can have the greatest impact on reducing waste generation. There are several ways a municipality can tackle the problem within its own jurisdiction and within ordinary households, promoting zero waste solutions with local residents. However, to truly have a meaningful impact on local waste generation, to help redesign our relationship with nature which is the ultimate vision embedded within zero waste,

⁵⁰ ZWF, 2019: <https://zerowastefrance.org/en/publication/mon-evenement-sportif-zero-dechet>

⁵¹ ZWF, 2019: <https://www.zerowastefrance.org/publication/livret-enfants-les-heros-du-zero-dechet/>



municipalities should target and provide greater incentives to businesses within the region - specifically local entrepreneurs, social enterprises and community groups that are working within the private sector and promote circular business models. Given their local knowledge and prominent role within a zero waste city, these stakeholders should be supported by legal (such as ensuring regulations are easy and smooth to work within), economic and social incentives (such as joint communications to increase customer bases) which would facilitate greater engagement, understanding and ultimately action from a wider group within the community towards the objectives of the local zero waste strategy.

Some of the outcomes that can be achieved through effective community engagement include⁵²:

- More effective projects on zero waste - participants become owners of the outcomes.
- Trust and credibility: builds relationships and allows the community to understand the constraints and benefits.
- Cost savings: high engagement projects mobilise volunteer energy.
- Technical competence: knowledge is captured through engagement, people bring depth and quality of skills, as well as other knowledge and new ideas.
- Better management of environmental, social and political risks: increase the perception of fairness, transparency and reduce risks of conflict.

G CONTINUALLY SEEKING TO IMPROVE, THROUGH RESIDUAL WASTE ANALYSIS

Conducting a waste assessment is an extremely important first step for municipalities and communities wanting to adopt a zero waste municipality plan, as well as being a practice that should continue throughout the implementation of the plan, in order to ensure the system is optimised and improves with time.

A household waste assessment is a methodical and robust process of collecting and analysing residual waste within a local area. Waste assessments help cities and communities determine the volume and types of waste generated by households and/or businesses within the municipality. The process can be done regardless of the fact whether separate collection of waste already exists. Often the analysis focuses on households and businesses, as municipal solid waste is one of the biggest contributors to total waste generation whilst simultaneously, greater impact can be had there in a shorter space of time. However, the same process can be replicated for schools, hospitals and larger businesses within a municipality, to help increase understanding and awareness of the total waste being generated in the local area.

⁵² NAAEE, 2017: https://naaee.org/sites/default/files/community_engagement_-_guidelines_for_excellence.pdf



There are several benefits of conducting an analysis of the residual waste in your community. The data from these assessments is crucial for designing effective policies to reduce waste generation locally. The success of zero waste strategies depends on the collection of local data, to ensure that the strategy is based upon the lived realities of households and is adapted to the local economic context.

Some of the key questions that a residual waste analysis can help answer include:

- What non-recoverable materials are most common and how can these be replaced with reusable, repairable or recyclable materials;
- How to design your separate collection system so that it encourages the least amount of residual waste generation as possible;
- What support residents need and therefore should receive to help them reduce their waste generation;
- How much budget to allocate to your zero waste plan and the level of income you can expect to generate from this;
- The size and design of local recycling / material recovery facilities;
- What the calorific value is of the residual waste and subsequently the carbon impact this would have when treated;
- How to best manage organic waste and what composting options could best be utilised within your local context.

Finding the answers to these questions and embedding them into the zero waste strategy is equally important at all phases of the zero waste journey. Whether the residual waste analysis is conducted at the start to get part of the baseline data to inform the design of a zero waste strategy, or whether it is done 3, 5 or 10 years into its implementation, the technique is an important tool that all municipalities serious about reducing waste in their community should utilise.

Furthermore, conducting a waste assessment can help bring a community together to help tackle waste and pollution issues. The process provides a unique opportunity to engage and educate the community on their waste generation, helping to visualise the problem and encouraging collaboration to prevent waste.

How to design and implement a residual waste analysis?

There are 4 main components of a waste assessment that need to be considered.

1. **Planning & consultation:** Identifying where the assessment will take place, whose waste will be assessed, how much waste will you assess, which partners need to be included and how you plan to secure their participation;
2. **Preparing the participants:** Whether the participants are households or businesses, or both, once they have agreed to participate in the assessment then they must be provided with sufficient information and materials. This is



to ensure they are separating their waste properly, aligning with the assessment structure, and to make sure that participants know what they need to do for each day of the assessment;

3. **Waste collection:** Set a collection timetable (ideally a week) with the local waste management authority. For each day's collection, make sure the waste is clearly weighted and labelled, with the data safely recorded;
4. **Assessment and sorting of the waste:** After the collection days have passed, the assessment of all the waste can begin. Separate the waste into the key waste streams that you want to measure and ensure the smooth transition of this waste for treatment or recycling afterwards.

The **key performance indicators** related to residual waste assessments are related to the volume of waste analysed (which will depend on the percentage of the local population who participate), the number of materials/types of waste that are measured, ranging from organics to PET plastic; and ultimately the number of policies and measures that have been identified.

For a full methodology of how to conduct a residual waste analysis, check out the following documents to begin with:

- [GAIA's Cities Waste Assessment and Brand Audit Methodology and Toolkit](https://www.no-burn.org/wabatoolkit/)⁵³
- [Zero Waste Europe's Waste Assessment Guide](https://zerowastecities.eu/academy/waste-assessment-guide/)⁵⁴

⁵³ GAIA, 2019: <https://www.no-burn.org/wabatoolkit/>

⁵⁴ ZWE, 2020: <https://zerowastecities.eu/academy/waste-assessment-guide/>



7 CONCLUSIONS AND SUMMARY

Today, countries located on both sides of the Mediterranean face unprecedented environmental and economic challenges. The COVID-19 pandemic has not only provided a health emergency, but it has worked to exacerbate existing fault lines within our society regarding environmental destruction and economic inequalities.

Therefore, there has never been greater urgency to find and adopt the right policy solutions. Luckily, we already have the tools and knowledge to help redesign our relationship with nature and resources towards one that is more sustainable.

Zero waste and Zero Waste Cities provide the framework for this change at the local level, often the location where change can be implemented with the most impact and relative ease. The power of the zero waste approach is that it provides a context-sensitive framework for change. Successful zero waste strategies are the ones which are embedded within the day to day reality of the community. With regular and meaningful engagement from community stakeholders, as well as local data being captured and measured to feed into the design and monitoring process, evidence shows that the most effective zero waste strategies are the ones which are interconnected and embedded within the local context.

It must be acknowledged that across the Mediterranean, there is a great degree of diversity between sub-regions, countries and even communities. This is why this guidebook has been designed to provide an overall framework and some key tools available to help local municipalities implement custom zero waste strategies.

The aim has been to provide readers not only with inspiration for how zero waste could be achieved in their local area, but to also provide confidence and reassurance that these measures can be effective in a wide range of contexts. There is a large and [ever-growing network](#) of both zero waste activists and cities who are showcasing how local communities can proactively take measures to reduce their waste, grow the local economy and protect the health of citizens.

Given the unique challenges that many regions in the Mediterranean face today, adopting a zero waste approach can significantly aid them to overcome those challenges. A zero waste strategy can sit at the heart of a local climate mitigation plan, help install an effective and cost-saving local waste management system, reduce the volume of waste generated by residents and visitors, overcome the challenges posed for municipalities with both urban and rural areas within their jurisdiction, and finally help embed the need to prevent waste within the day to day life of a community, through greater reuse, repair and redesigning of products.



We hope this guidebook is a useful tool for you on your zero waste journey, helping redesign our relationship with nature and therefore accelerating the transition towards a sustainable, circular future.

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9 BIBLIOGRAPHY AND FURTHER READING

Main sources and further reading:

Zero Waste Europe (ZWE): <https://zerowasteurope.eu/>

The Zero Waste Cities programme: www.zerowastecities.eu

The Zero Waste Hierarchy, as defined by the Zero Waste Cities programme of Zero Waste Europe: https://zerowastecities.eu/discover/#zw_hierarchy

The Zero Waste Masterplan: <https://zerowastecities.eu/learn/>

The zero waste definition, Zero Waste International Alliance, 2018: <https://zwia.org/zero-waste-definition>

The Zero Waste Cities Savings Calculator, EBM, ZWE, HD, 2020: <https://zerowastecities.eu/academy/savings-calculator>

Case studies:

ZWE, 2019: <https://zerowastecities.eu/bestpractice/besancon/>

ZWE, 2018: <https://zerowastecities.eu/bestpractice/the-story-of-sardinia>

ZWE, 2020: <https://zerowastecities.eu/academy/waste-assessment-guide/>

ZWE, 2019: <https://zerowastecities.eu/bestpractice/the-story-of-pontevedra>

ZWE, 2018: <https://zerowastecities.eu/bestpractice/best-practice-the-story-of-argentina>

ZWE, 2020: https://zerowasteurope.eu/wp-content/uploads/2020/11/zwe_11_2020_factsheet_balearicislands_waste-prevention_en.pdf

Zaid Abichaker, '1300 days of consecutive operations at Beit Mery's Sorting/Composting Facility,' 2020: <https://linkedin.com/pulse/1300-days-consecutive-operations-beit-merys-facility-ziad-abichaker>

The City of Kiel's zero waste strategy, 2020:

https://www.kiel.de/de/umwelt_verkehr/zerowaste/

State of Zero Waste Municipalities Report 2020: <https://zerowastecities.eu/the-story-of-zero-waste-cities/>



The SCOW (Separate collection of organic waste in tourist areas) project:

<http://www.biowaste-scow.eu/About>

INTHERWASTE: <https://www.interreurope.eu/intherwaste/case-studies/>

Base data:

The European Union's Plastics Strategy, 2018:

<https://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy.pdf>

EEA, 2014: <https://eea.europa.eu/publications/horizon-2020-mediterranean-report/file>

EEA, 2015: <https://www.eea.europa.eu/soer/2015/countries/mediterranean>

World Bank, 2018: <https://openknowledge.worldbank.org/handle/10986/30317>

RREUSE, 2015: Briefing on job creation potential in the re-use sector

Catasto Nazionale Rifiuti: <https://www.catasto-rifiuti.isprambiente.it>

Best practice examples of zero waste business models:

- Unverpackt (Germany): <https://original-unverpackt.de/>
- eReuse (Catalonia): <https://zerowasteurope.eu/2018/12/press-release-case-study-ereuse/>
- ReCircle (Switzerland and Germany): <https://www.recircle.de/>
- PHENIX (France): <https://zerowasteurope.eu/2019/06/the-story-of-phenix-a-recipe-to-effectively-enforce-food-waste-reduction-targets/>
- ETA BETA social enterprise, Bologna, Italy: <https://www.etabeta.coop/eta-beta/>
- ETA BETA's LAVANDA project on reusable nappies: <https://www.etabeta.coop/lavanda/>

Other:

EC, 2020: https://ec.europa.eu/commission/presscorner/detail/en/ac_20_602

IUCN, 2020: <https://www.iucn.org/news/marine-and-polar/202010/over-200000-tonnes-plastic-leaking-mediterranean-each-year-iucn-report>

ARLEM, 2014: <https://cor.europa.eu/Documents/Migrated/news/rapport-sudev-dechets-2014-en.pdf>

BBC, 'Mediterranean plastic pollution hotspots,' 2019:

<https://bbc.com/news/world-48554480>

Eionet Portal, 2016: https://eionet.europa.eu/etcs/etc-wmge/products/other-products/docs/turkey_msw_2016.pdf

Global Recycling, 2019: <https://global-recycling.info/archives/2620>

WWF, 'Mediterranean countries fail to protect their sea while biodiversity declines at unprecedented rate,' 2019:

https://wwfmmi.org/newsroom/latest_news/?uNewsID=356339 ()

Deutsche Welle, 'Trash crisis forces Lebanon's environmental awakening,' 2016:

<https://dw.com/en/trash-crisis-forces-lebanons-environmental-awakening>

E. Azzi, 'Waste management systems in Lebanon -The benefits of a waste crisis for improvement of practices,' 2017: <https://kth.diva-portal.org/smash/get/diva2:1139992/FULLTEXT01.pdf>

PubMed (Spain), 'The impact of tourism on MSW generation: The case of Menorca Island', 2013: <https://pubmed.ncbi.nlm.nih.gov/24001553>

Kounani, Skanavis, 2018: <https://researchgate.net/publication> (Refugee crisis: Greek residents' attitudes towards waste management in their region)



UNHCR, 2020: <https://reporting.unhcr.org/jordan> (Jordan Zaatari Refugee Camp Fact Sheet - August2020)

OXFAM, 2017: <https://oxfam.org/en/research/trash-talk-turning-waste-work-jordans-zaatari-refugee-camp>

ZWE, 'Zero Waste Circular Economy: a solid investment for Sustainable Finance, 2020: https://zerowasteurope.eu/wp-content/uploads/2020/11/zero_waste_europe_report_sustainable-finance-for-a-zero-waste-circular-economy_en.pdf

ZWE, 2019: <https://zerowasteurope.eu/library/the-impact-of-waste-to-energy-incineration-on-climate>

Zero Waste France, 'Zero Waste Sporting Events' 2019:

<https://zerowastefrance.org/en/publication/mon-evenement-sportif-zero-dechet>

Zero Waste France 'Les Heros du zero dechet':

<https://www.zerowastefrance.org/publication/livret-enfants-les-heros-du-zero-dechet/>

NAAEE, 2017: https://naaee.org/sites/default/files/community_engagement_-_guidelines_for_excellence.pdf

GAIA, 2019: <https://www.no-burn.org/wabatoolkit/>

