

CASE STUDY

Fighting climate change, one bio-waste bin at a time

How the #ForkToFarm project supports
Montenegro's environmental transition



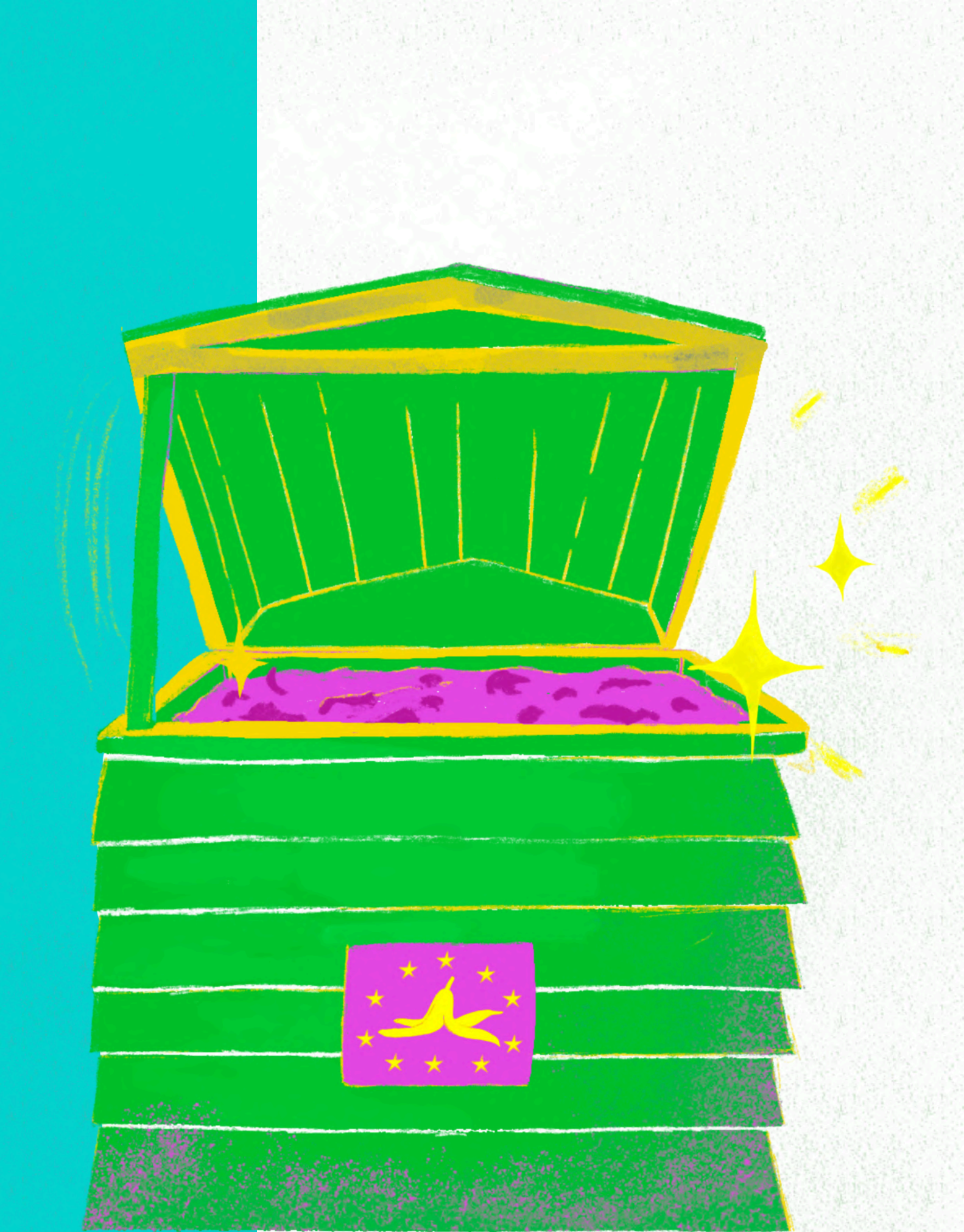
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Background and context

Biodegradable waste (bio-waste for short), which includes food and garden waste, continues to provide one of the most stubborn challenges for local authorities wishing to implement effective waste management systems. If you analyse the composition of residual waste in most European municipalities today, you will find that more often than not, bio-waste is the biggest percentage waste stream that remains being sent to landfill or incineration.

The fact that bio-waste remains ineffectively captured and treated, let alone prevented in the first place, causes a wide array of negative environmental, health, and economic problems.



The waste sector in Europe is the second-largest sector responsible for emitting methane, caused primarily by bio-waste sitting untreated in landfills. At the same time, methane also has significant effects on human health, as it leads to ground-level ozone and respiratory problems, contributing to 70,000 premature deaths in the EU every year. Furthermore, European soils are desperately short of nutrients, which hampers crop production and the long-term capability of Europe to produce healthy food. Most of these nutrients could be restored if the soil is

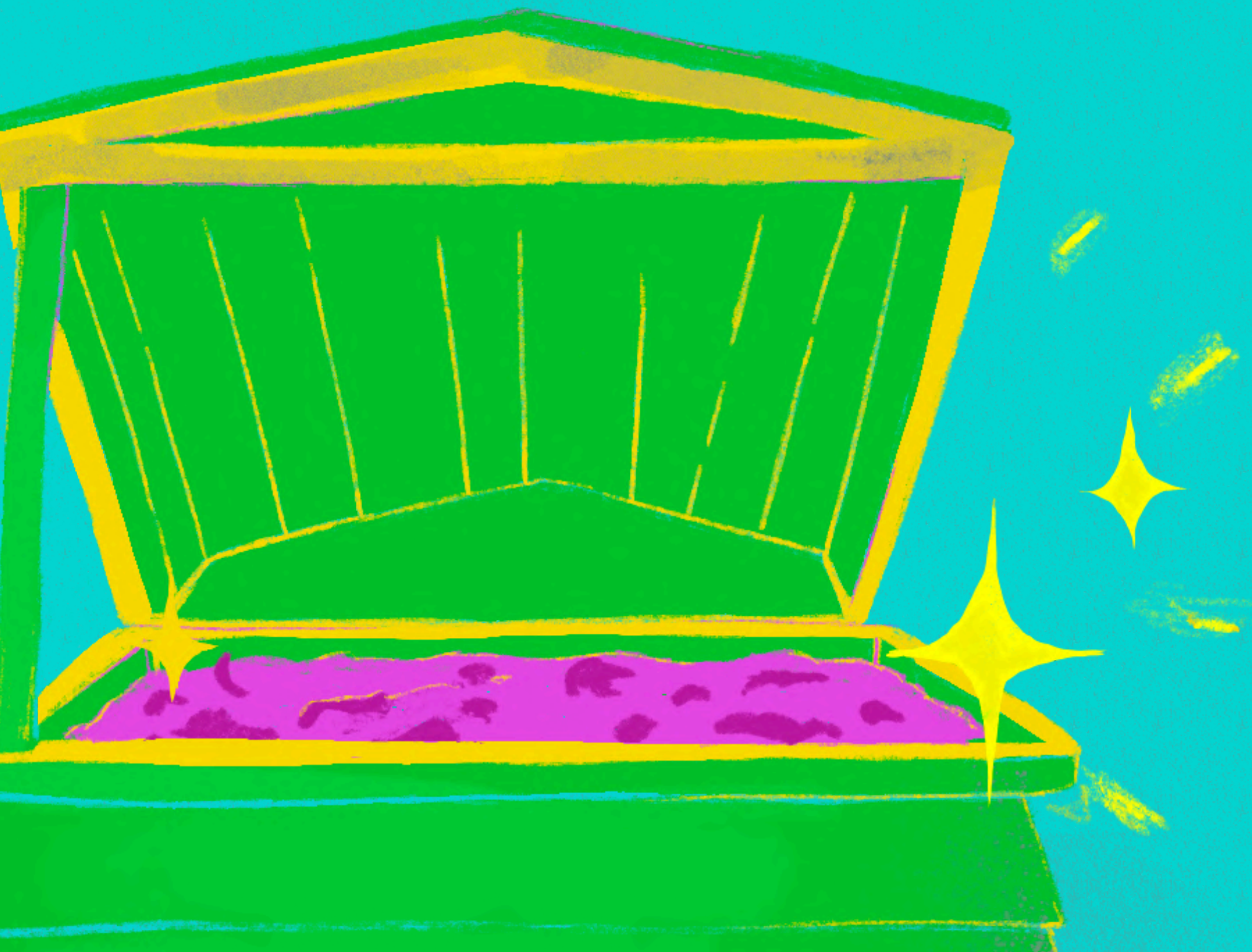
provided with compost as a natural fertiliser, reducing the need for fossil fuels, which form the basis of most fertilisers today.

Optimising separate collection systems for bio-waste can also bring municipalities cost savings within public budgets by having less waste to dispose of and more composting done at home or in community hubs. Effective systems also reduce the volume of plastics contaminating the bio-waste stream, helping reduce treatment costs for cities, while also minimising the dangerous exposure for citizens to toxic

chemicals found in most microplastics that can be found in compost. Separately collected bio-waste also offers energy creation opportunities

through anaerobic digestion or bio-gas, reducing dependence on imports and providing a potential source of income generation for local authorities.

This non-exhaustive list of benefits for effectively collecting and treating bio-waste forms the foundations of this case study and the exceptional work undertaken in Montenegro by Zero Waste Montenegro, as part of the #ForkToFarm project.



The #ForkToFarm project

From 1 January 2024 onwards, all EU Member States are required to separately collect bio-waste at the local level. Yet, the performance of such collection systems is still lagging behind where it needs to be. Our 2024 research showed that only 26% of food waste generated in the EU is currently being captured and treated, which means that 74% of all food waste still ends up in landfills or incinerators. The obligation was introduced by the EU to

help meet the bloc's targets for recycling of municipal waste, including a 55% recycling rate for 2025 that increases to 60% by 2030, and 65% by 2035.

Across the continent, there is an increasing trend among municipalities to opt for the cheapest and easiest options to comply with this requirement,





which simply involve putting large open street bins out for bio-waste (despite clear data showing how poor and ineffective these systems are compared to door-to-door collection models).

Without action now, there is a grave risk that these poor-performing systems become embedded in European municipal systems. This is why in 2024, ZWE created the #ForkToFarm project. Together with other organisations in the ZWE network, the project aims to change the status quo for bio-waste in Europe. We aim to ensure that food waste generated by households and businesses does not end up in landfills or incinerators but rather is captured and managed properly to return to the cycle as a vital supporter of local soil health.

#ForkToFarm seeks to raise awareness on how to properly collect and manage bio-waste at the local level and support municipalities in designing the right setup for their local context. Many best practices already exist in Europe, and many more are in the process of being built. Yet, more action is needed and at a quicker pace. Fortunately, the solutions already exist, are low-cost, and have proven to be effective in a range of contexts. While the issue of tackling food waste is complex and global, local communities can be at the forefront of change in ensuring that what food waste is generated post-consumption can at least be effectively captured, managed (composted),



and then returned to the soil.

Zero Waste Montenegro is one of seven ZWE members participating in the #ForkToFarm project, which helped provide extra resources and support to enable the scale-up of the work across Montenegro, which is the focus of this case study.

Status of waste management in Montenegro

Montenegro continues to face significant pressure in the field of waste management. Municipal waste generation has been increasing over several consecutive years, reaching 360,137 tonnes in 2023 and rising again to 375,460 tonnes in 2024. Per-capita waste generation remains high at 577.5 kg per person, placing the country above many European averages. Despite mounting volumes, recycling rates remain extremely low. In 2024, an estimated 91.6% of all treated municipal waste was



View over Utvrđeni grad Stari Bar in Bar, Montenegro

still sent to landfill. Alongside the two sanitary landfills in Podgorica and Bar, more than 330 illegal dumpsites continue to pose long-term risks to public health, biodiversity and water resources.

Organic waste is central to these challenges. It represents around 40% of Montenegro's municipal waste stream, with over 130,000 tonnes per year, the majority of which has historically been disposed of untreated. Landfilling biodegradable waste leads to high methane emissions, odour problems, groundwater risks and the loss of nutrients that could otherwise support soil regeneration and local food systems.

To address these pressures, Montenegro has recently strengthened its policy and legal framework.





Bio-waste collected in Urban Garden Podgorica

The Waste Management Law (2024) introduces mandatory separate collection of bio-waste, aligns national obligations with the EU Waste Framework Directive, and raises treatment standards. These commitments are further operationalised through the State Waste Management Plan 2025–2029, which sets clear quantitative targets, including the introduction of bio-waste collection in all municipalities and reducing biodegradable waste landfilled to 75% of 2010 levels by 2025, 50% by 2029 and 35% by 2033.

These measures represent an important step forward, but implementation on the ground remains uneven.

Most municipalities still lack the infrastructure, operational capacity or community engagement needed to meet national and EU-aligned targets. This gap highlights the importance of decentralised and community-driven solutions, which can be rolled out quickly, cheaply and with strong citizen ownership.

In this context, the work undertaken through the #ForkToFarm project plays a crucial role. By introducing home and community composting models, supporting early municipal pilots, and demonstrating practical ways to divert organic waste from landfill, the project helps translate national commitments into real change on the ground, offering replicable, community-centred approaches that directly support Montenegro's environmental transition.



Major obstacles and environmental risks

Despite recent policy improvements, Montenegro continues to face a number of structural and operational obstacles that slow progress toward more sustainable waste practices. The most significant challenge remains the limited capacity of municipalities to introduce and maintain separate collection systems. Many local governments lack the necessary equipment, infrastructure, and trained staff to establish regular and reliable bio-waste collection. This results in persistent

dependence on landfilling and delays in meeting the requirements set out in the Waste Management Law and the State Waste Management Plan.

A further challenge is the absence of adequate treatment facilities.

With only two sanitary landfills and one composting facility in the municipality of Kotor,



biodegradable waste continues to be disposed of untreated. This contributes to methane emissions, odours, and leachate that can contaminate soil and groundwater. Illegal dumpsites, more than 330 across the country, exacerbate these risks and undermine the effectiveness of local waste systems.

Public awareness also remains uneven. While interest in composting is growing, many households are still unfamiliar with the benefits of separate collection or sceptical about the reliability of municipal services. This often leads to low participation rates or contamination of collected bio-waste. In rural areas, informal burning and uncontrolled dumping of organic and green waste remain common practices.

Financial constraints further limit progress.



Municipal budgets are often insufficient to purchase bins, vehicles, or shredding equipment, and the national system for cost recovery is still in development. As a result, municipalities tend to prioritise essential daily operations over new, more sustainable systems.

These obstacles carry clear environmental risks: continued landfilling of biodegradable

waste drives methane emissions; unmanaged green waste contributes to uncontrolled burning; and the lack of circular solutions leads to the loss of valuable organic material that could support soil regeneration. Addressing these challenges requires a combination of stronger local capacities, practical community-level solutions, and long-term investment in decentralised bio-waste systems.



Project setup and scope

The #ForkToFarm project in Montenegro was designed as a practical, community-centred response to the long-standing gap in bio-waste management at the local level. Although Montenegrin legislation now requires separate bio-waste collection and improved treatment standards, most municipalities still lack the necessary tools, systems, and experience to implement these obligations.

This project, therefore, focused on building the first working examples of decentralised organic-waste solutions in selected municipalities, demonstrates how small, low-cost interventions can trigger broader change.



Garden compost pilot in Danilovgrad



Information on how to separate bio-waste for composting in Urban Garden Podgorica



Interview with Vanja Cicmil, Executive Director of Zero Waste Montenegro (ZWMNE)

The project began by identifying municipalities where early action was both feasible and strategically important. Initial discussions were held with Danilovgrad and Tuzi, which expressed readiness to test household composting and small-scale collection models. As local enthusiasm grew, the scope expanded to Podgorica and Kotor, two municipalities with very different starting points. Podgorica, with no functioning bio-waste system, provided an opportunity to introduce new community and residential composting models, while Kotor, already operating the country's only composting facility, offered a setting to strengthen and expand an existing system through improved door-to-door collection.

The set-up phase relied heavily on collaboration with municipal



authorities, public utility companies, community groups, and local volunteers. Before implementation, each pilot area underwent a joint planning process: mapping neighbourhoods, defining roles, selecting households, and clarifying how organic waste would be collected, monitored and treated. This created shared ownership from the start and ensured that each model aligned with the municipality's capacity and local context.

The scope of the project combined several complementary approaches:

- Home composting, introduced where individual households had space and interest;
- Community composting, developed in urban areas where residents lacked private gardens;
- Neighbourhood-level bio-waste collection, tested through door-to-door models in cooperation with utility companies;
- Market-based pilot, targeting stallholders to capture organic waste from food markets.

By integrating these elements, the project established locally adapted examples of organic waste diversion in Montenegro. The approach was intentionally modular: each municipality adopted the components most relevant to its situation, enabling a flexible model that can be easily replicated or scaled.

The scope of work grew organically as municipalities and initiatives expressed increasing confidence and willingness to participate, ultimately connecting households, community gardens, schools, public markets, and utility companies into a shared effort to reduce the volume of organic waste sent to landfill.



View over the Morača river, Podgorica

Project rollout

The #ForkToFarm project began with modest expectations to test simple composting models in two municipalities and assess whether residents would be willing to participate. However, the scale of engagement and the diversity of emerging initiatives soon surpassed what was planned initially, allowing the project to grow steadily and adapt based on real community interest.

Danilovgrad and Tuzi - solid pilots that set the foundation

The first activities in Danilovgrad and Tuzi focused on household composting and small neighbourhood-level bio-waste separation. The participation results were encouraging. In Danilovgrad, 150 households began backyard composting using Bokashi kits, receiving guidance



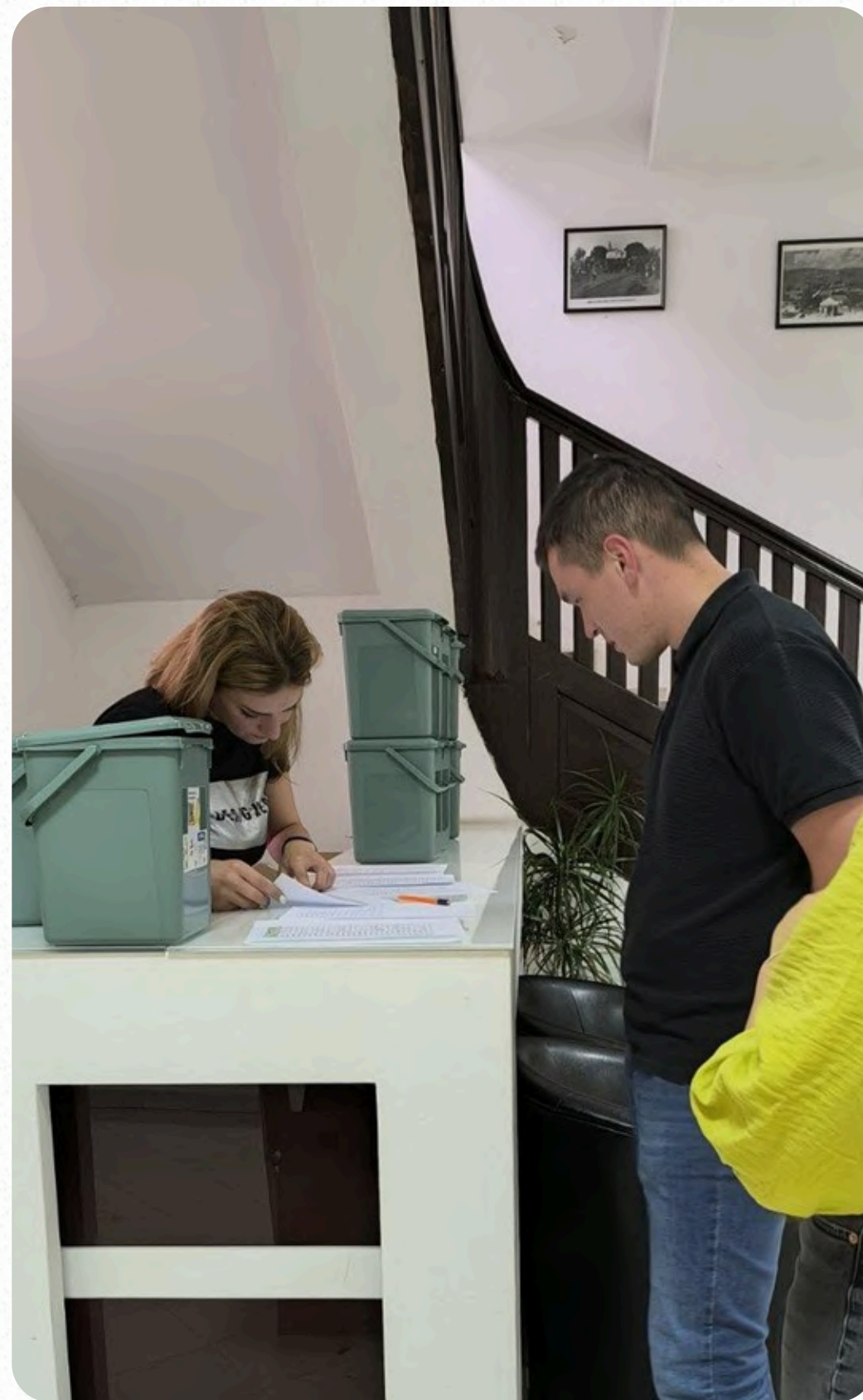
through in-person support and a dedicated Viber group. In Tuzi, 300 households joined door-to-door organic waste collection, while 50 households started home composting.

Follow-up surveys showed that almost all participating households intended to continue composting, and early projections indicate that more than 158 tons of organic waste per year were being prevented from entering landfills across the combined pilot areas.



Survey results also confirmed strong behaviour change: nearly 88,4% of participating households began composting immediately after receiving bins or kits, and all respondents (100%) stated they intended to continue in the long term.

In addition to this, 71,1% reported a visible reduction in mixed waste, and 63,2% said composting became easy after initial guidance. These outcomes demonstrated that small, low-cost systems could be effectively implemented and maintained.



Kitchen waste bin distribution in Danilovgrad and Tuzi

Expansion to Podgorica – community composting takes shape

Based on successful early results, the project expanded to Podgorica, where the urban context offered an opportunity to pilot community composting. In cooperation with Urban Garden Podgorica, 100 composting bins were distributed to citizens, and the city approved the installation of its first community composting site.

A second site, Community Garden Pomorandža, was later established with support from a parallel project, and 100 additional households received bins to deposit organic waste directly into the garden's shared composter.



Interview with Mihailo Marić, volunteer at Urban Garden Podgorica, on the setup of the garden



Interview with Mihailo Marić, volunteer at Urban Garden Podgorica on collection and composting

These pilots demonstrated that community composting could function in multi-apartment settings and provided a practical model for future replication in other urban neighbourhoods. Bašta Pomorandža also showed how composting can support broader neighbourhood improvements. The composting activities mobilised residents and volunteers, eventually leading to cooperation with the City of Podgorica to transform a previously degraded gravel area in front of the building into a future community park. This initiative illustrates how small environmental practices can encourage more sustainable use of public spaces.

The Municipality of Podgorica formalised cooperation with ZWMNE through a memorandum of understanding (MoU), allowing the creation of composting gardens on unused municipal land, an administrative improvement that enables quicker replication.



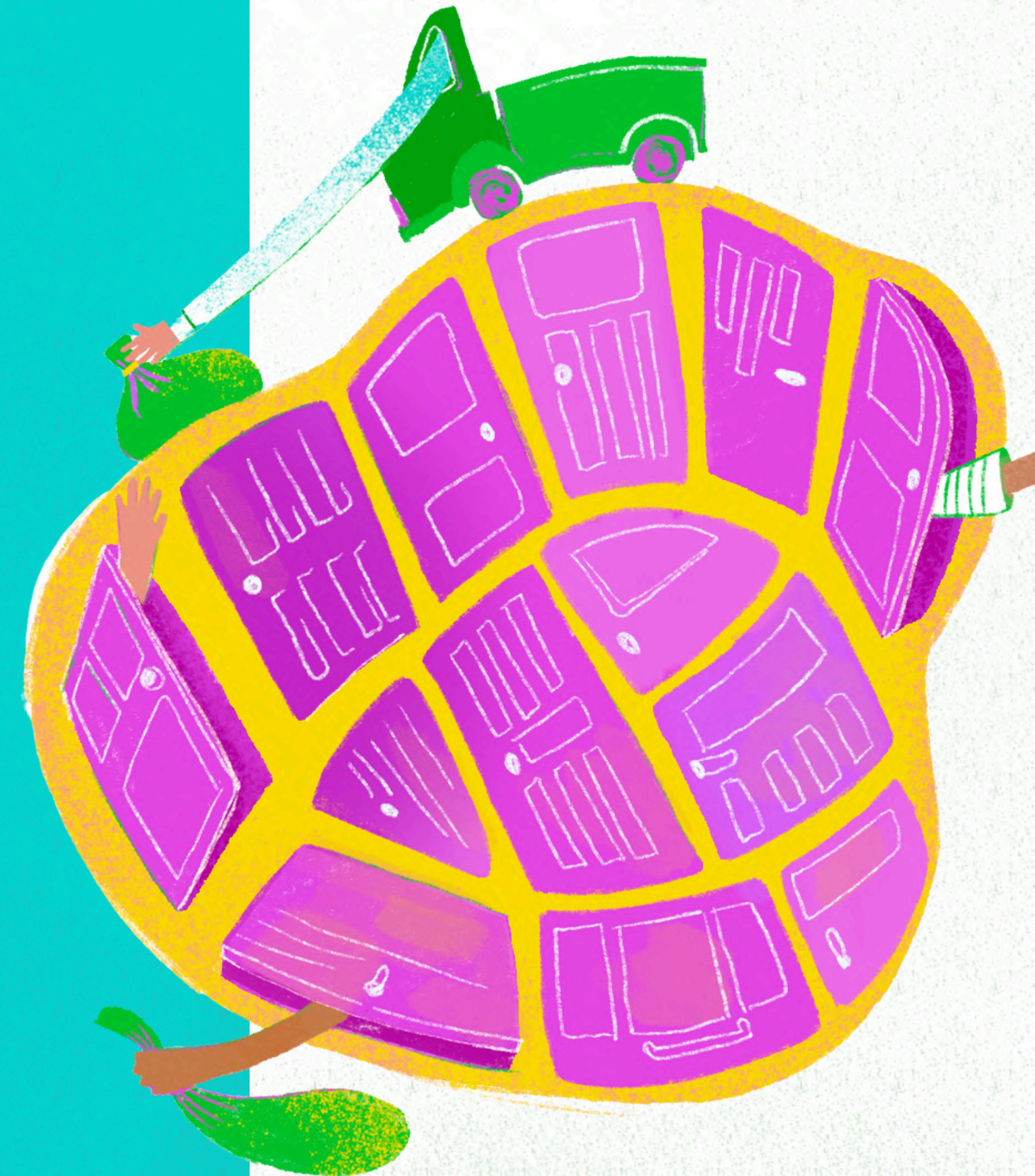
Urban Garden Podgorica

Community Garden Pomorandža

Kotor – integrating organic waste into an existing collection system

In Kotor, the project aligned with an already established door-to-door collection system. The public utility company introduced household organic waste collection for the first time, distributing 200 bins after conducting an outreach campaign. Until this point, the company handled only green waste from public areas, so the addition of household bio-waste required operational adjustments and a dedicated composting batch for testing.

Discussions are ongoing about expanding the system to institutional generators, such as the city market and student canteen.





Kotor's door-to-door collection system

Lješkopoljska Gorica – organised green-waste processing in a vulnerable area

#ForkToFarm also supported activities at Lješkopoljska Gorica, an ecologically sensitive area undergoing reforestation. With a shredder provided through the project, the local initiative [Ozelenimo.me](https://www.ozelenimo.me), along with several partner farms, households, and institutions, began processing their green waste for mulching and composting rather than sending it to landfill.

Across several actions, approximately 24 m³ of mulch were produced, and around 5,600 kg of green waste were processed for on-site ecological restoration. This work showed how simple equipment can help close the loop in landscape management.



Lješkopoljska Gorica

“Tržnice i pijace” – piloting bio-waste management at public markets

Another strand of the project involved co-operation with Tržnice i pijace, the municipal operator of Podgorica’s public markets. A small pilot was launched at the city market, where ten market stallholders were equipped with

organic waste bins, and a shared on-site composter was installed. This pilot helped demonstrate how bio-waste from fruit and vegetable stalls can be collected and treated locally, offering practical experience for a sector where organic waste volumes are consistently high.



“Tržnice i pijace” Podgorica



Compost quality analysis

To verify the safety and quality of the compost produced through the pilot activities, two samples were analysed by the Center for Ecotoxicological Research (CETI) in Podgorica. One sample came from the public community composter at the Urban Garden Podgorica, and the other from a private household composter in Danilovgrad. Both were tested for physical impurities, organic-matter content, and heavy-metal concentrations, using national and EU reference values for quality classes.

Physical impurities were extremely low in both samples (<0.001%), far below the reference limit of <0.5%, confirming clean inputs and proper sorting. The organic-matter content demonstrated clear quality differences between the two systems.





The Urban Garden sample contained 57% organic matter, well above the >15% reference value, indicating a high level of biological maturity and suitability for soil improvement. The private household sample contained 16%, still above the minimum requirement and within acceptable quality standards.

Heavy-metal analysis showed that both composts meet the criteria for the highest quality category. The Urban Garden sample contained lower concentrations of lead (5.5 mg/kg), chromium (20 mg/kg) and nickel (17 mg/kg) compared to the household sample (Pb 17 mg/kg; Cr 60 mg/kg; Ni 37 mg/kg). Levels of cadmium and mercury were nearly identical between the two samples (Cd 0.32 vs. 0.19 mg/kg; Hg 0.048 vs. 0.047 mg/kg). The Urban Garden compost showed higher concentrations of zinc (354 mg/kg) and copper (84 mg/kg) compared to the household sample (Zn 86 mg/kg; Cu 24 mg/kg).



Greenhouse with vertical garden in Urban Garden Podgorica

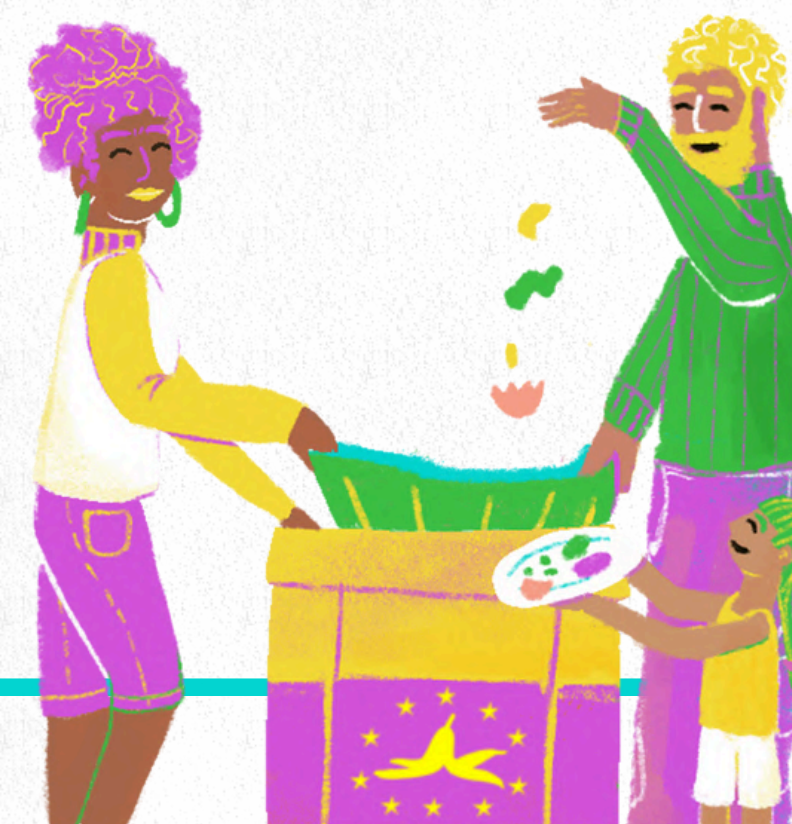
These elevated levels reflect the purely plant-based composition of the community compost: zinc and copper are naturally occurring essential elements in plants, and during composting plant mass decreases while mineral elements remain, leading to higher concentrations in the final product.

Despite these differences, both samples fully comply with national and EU standards for first-category compost. The results confirm that the compost produced through the #ForkToFarm pilots is environmentally safe, agronomically valuable, and suitable for use in gardens, community green areas, and potentially in agricultural applications.

Community engagement and education

Alongside the technical and operational activities, the project placed strong emphasis on public engagement and practical learning. The two community gardens in Podgorica, Urban Garden Podgorica and Bašta Pomorandža, became important centres for outreach, hosting a series of joint activities for residents, families, and children. These included hands-on composting demonstrations, seasonal gardening workshops, and small volunteer actions

focused on maintaining shared spaces and improving local green areas. Participation in public events, like European Researchers' Night, where a composting workshop attracted children, youth, and families, helped demystify composting and landfill methane, making it accessible and engaging for younger generations through interactive activities and practical demonstrations.



As part of the awareness-raising, Zero Waste Montenegro launched the web resource “All About Composting”, offering a comprehensive digital guide to home and community

composting. The page includes a downloadable brochure, practical tips, and step-by-step instructions on how kitchen scraps and garden trimmings can be turned into nutrient-rich soil. This online resource complements on-the-ground activities by ensuring that residents have



continual access to clear, user-friendly composting guidance long after the initial pilot phase. Throughout the project period, these community-based spaces served as informal learning hubs. Residents exchanged knowledge about gardening and soil health, school groups visited to learn about organic waste, and volunteers played an active role in maintaining composters and supporting newcomers. This combination of practical action and ongoing education helped reinforce the long-term value of composting and strengthened the social dimension of the project.



Composting workshop organised by Zero Waste Montenegro

Challenges faced along the way

Throughout implementation, the #ForkToFarm project encountered a range of practical and institutional challenges that influenced the pace of activities and shaped how the work evolved in each municipality. These challenges did not prevent progress, but they required flexibility, additional support, and in some cases adjustments to the original plans.

A recurring issue across municipalities was the limited operational capacity of public utility

companies. Many were already overstretched and had difficulty integrating new tasks, such as maintaining regular collection routes for bio-waste or dedicating staff to monitoring and community engagement. This was particularly visible in Tuzi, where household participation remained high, but collection consistency depended heavily on daily staffing realities.





Similar constraints affected planning processes in Podgorica and Kotor, where utilities expressed interest but had limited time and resources to take on additional responsibilities.

Another challenge was the lack of infrastructure for bio-waste treatment. Aside from the small composting facility in Kotor, Montenegro has no dedicated treatment plants, which meant that all pilots needed to rely on small-scale or community-based composting.

While effective, these systems require space, coordination, and basic process control. Municipal teams and residents often needed hands-on support to ensure proper separation, moisture balance, aeration, and storage, everyday tasks that are essential for maintaining quality compost.

Behavioural and awareness barriers also emerged. Although most households were willing to participate, understanding proper sorting practices required ongoing communication, especially in urban neighbourhoods and public markets. Market stallholders, for example, often needed repeated reminders. In a few pilot areas, municipal staff themselves needed time to adjust to new practices that differed from long-standing landfill-centred systems.

Administrative procedures occasionally slowed progress as well. Before the City of Podgorica introduced a simplified framework for

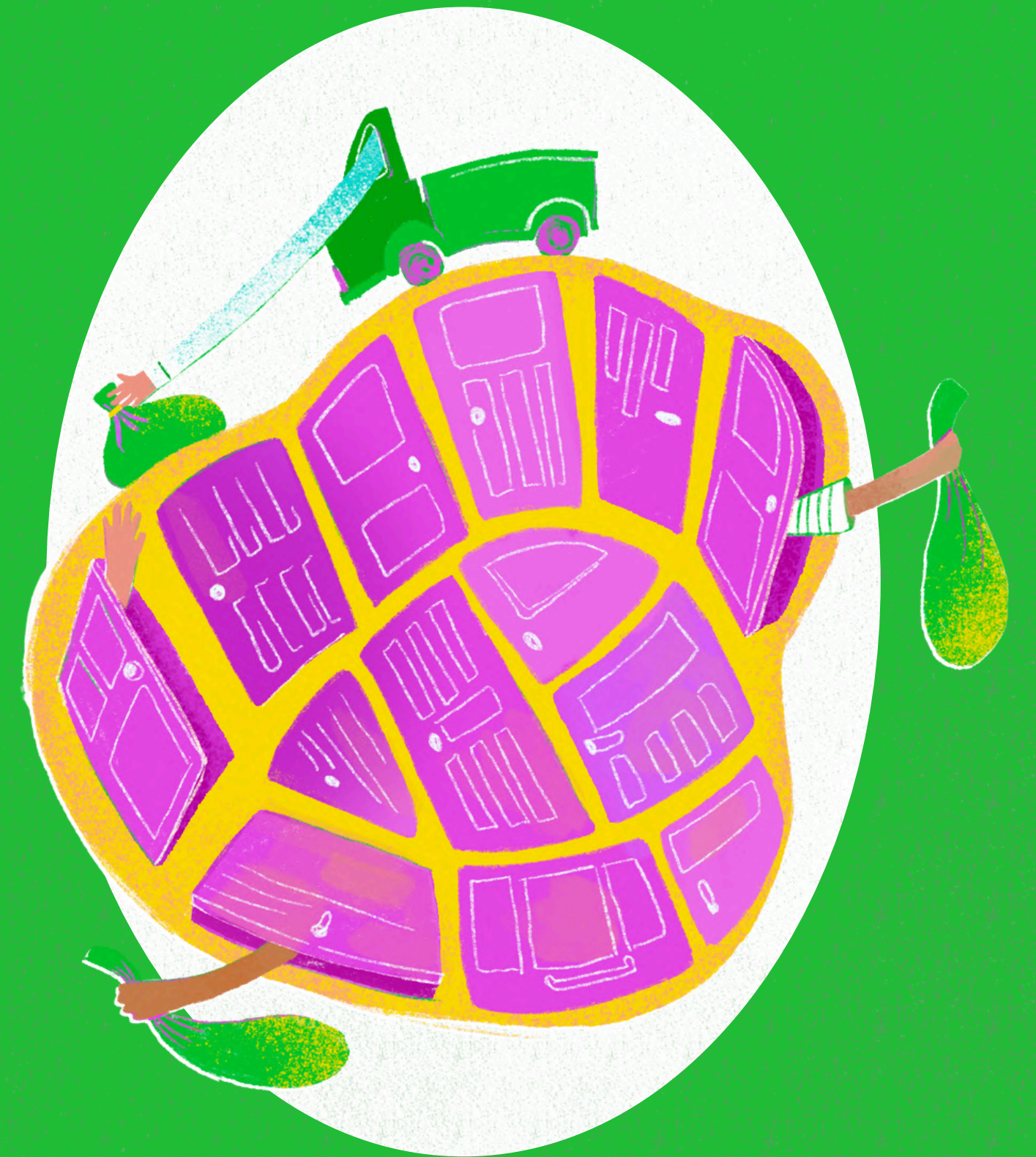
composting gardens through an MoU, each new location required separate approval and coordination, which added delays to early stages of expansion. Similar procedural steps in other municipalities meant that some activities progressed more slowly than planned.

Technical and logistical realities also influenced implementation. Community composting sites required more maintenance than anticipated, including regular turning, pest prevention, and managing space during peak gardening seasons. In multi-apartment buildings, identifying suitable locations for

composters and ensuring shared responsibility among residents proved challenging. In Lješkopoljska Gorica, terrain conditions made the transport and processing of green waste more demanding, relying heavily on volunteers and personal equipment.

Finally, questions of long-term sustainability were always present. While municipalities expressed strong interest in continuing pilots, their capacity to maintain systems after the project depended on staff availability, stable budgets, and integration into formal waste-management planning.

Ensuring that these pilots evolve into permanent services remains an ongoing effort.



Future of the project in Montenegro

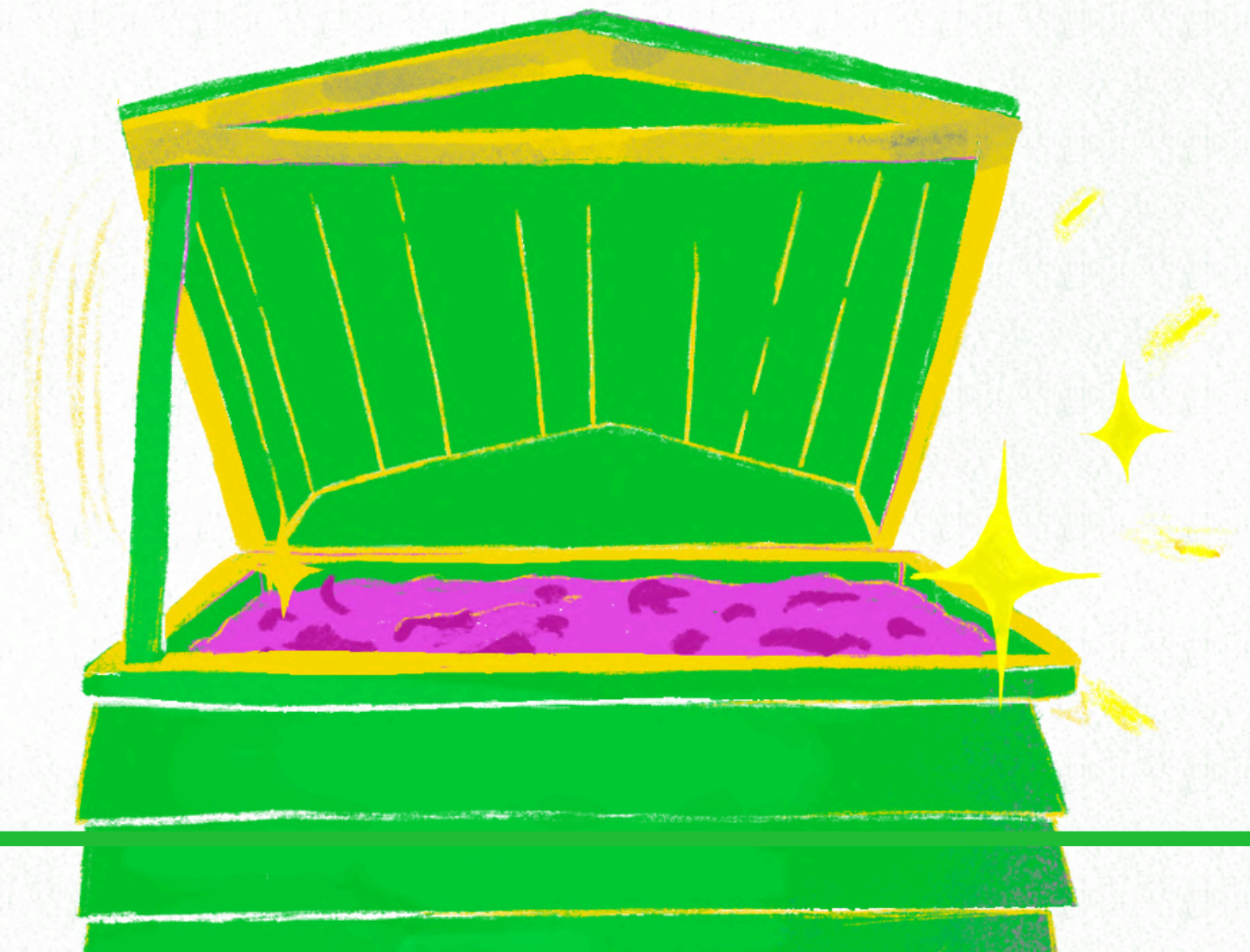
The #ForkToFarm project has shown that decentralised bio-waste solutions can function effectively in Montenegro, even in municipalities with limited infrastructure. The experiences and models developed through #ForktoFarm leave behind a practical foundation that municipalities and local actors can further build upon, if they so choose.

In several municipalities, particularly Podgorica, Tuzi, Danilovgrad, and Kotor, the pilots created initial structures and community interest that may support further development independently of the project. In Kotor, household organic waste collection has now been introduced for the first time, and the public utility company has gained



experience with processing kitchen waste. Whether the system expands will depend on municipal priorities and resources, but the pilot has provided a starting point that the utility can draw from. Similar opportunities exist in Tuzi and Danilovgrad, where household engagement was strong and where municipalities may choose to maintain or adapt composting models based on their own capacities. The green-waste work in Lješkopoljska Gorica demonstrated how simple equipment can support local restoration efforts, and that model could potentially be replicated elsewhere by community initiatives

or municipal services if there is interest. The pilot at the Podgorica public market likewise offers a small but practical example for market-based bio-waste management that could be taken forward by the city, should it wish to standardise this approach.



At the national level, Montenegro's legal requirements for separate bio-waste collection continue to create a long-term policy incentive for municipalities to explore low-cost solutions such as home and community composting. The methods, tools, and lessons generated through the pilots remain available for municipalities, civil society organisations, and community groups seeking to align with these obligations.

In this sense, the future of the work does not depend on the continuation of the #ForkToFarm project itself, but on how local actors choose to apply and adapt what has been demonstrated.



The project has provided initial models and practical experience, and these can serve as reference points for any municipality or community that decides to further develop decentralised bio-waste systems in Montenegro.

Conclusion and lessons learnt

#ForkToFarm introduced practical models for managing organic waste in Montenegro at a time when municipalities were preparing to meet new national obligations. Although the pilots were limited in scale, they demonstrated that simple, low-cost composting solutions can function in a wide range of environments, such as rural households, multi-apartment buildings, community gardens, public markets, and even ecologically vulnerable areas. The project's main contribution lies not only in the tonnes of bio-waste diverted from disposal, but in providing municipalities and communities with their first hands-on experience in systems that had scarcely existed previously.



Composter in Urban Garden Podgorica

Several lessons emerged along the way:

1 Community motivation is often higher than expected, but consistent support is needed to turn initial interest into stable practice. Clear instructions, regular communication, and occasional troubleshooting proved essential for maintaining participation.

2 Establishing clear, shared responsibilities among residents, volunteers, and municipal services is important. While communities often demonstrated strong motivation, long-term stability depended on ongoing

guidance and occasional supervision, particularly in high-use sites such as community gardens and public markets.

3 Municipal capacity remains the determining factor for long-term continuity. Pilots succeeded when public utility companies were able to dedicate staff or adjust routines, and progressed more slowly where daily operations were already stretched. Even small-scale bio-waste systems benefit from stable institutional support.

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Decentralised composting can complement, but not replace, municipal infrastructure. Community and home composting offer fast and affordable options, yet they require appropriate locations, shared responsibility, and ongoing monitoring. They work best when municipalities view them as part of a broader strategy rather than isolated experiments.

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Administrative clarity matters.

The introduction of a Memorandum of Understanding (MoU) in Podgorica significantly reduced procedural delays

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and created a more enabling environment for community initiatives. Similar streamlined frameworks could support other municipalities in the future.

Composting initiatives can generate broader local benefits. In several areas, residents used compost to rehabilitate small green spaces, and in Podgorica, a former gravel parking area is being transformed into a future community park. These outcomes illustrate how bio-waste projects can encourage stewardship of public

space and strengthen neighbourhood cohesion, even when implemented at a small scale.



Communication and visibility matter.

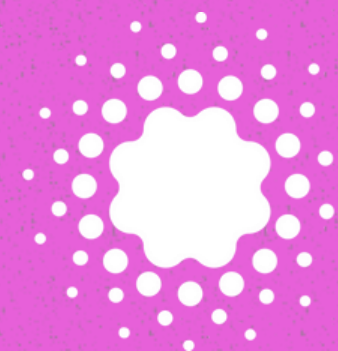
Outreach activities and volunteer involvement helped several pilots stabilise more quickly. These experiences underline that technical models alone are not sufficient. Steady engagement, support networks, and accessible information are equally important for successful and sustainable bio-waste practices.

Overall, the project provided valuable insights into how Montenegro can begin aligning local practice with national policy goals for organic waste management. The models developed through #ForkToFarm are not final solutions, but they offer a practical starting point for municipalities, institutions, and community groups seeking to build more resilient, decentralised and sustainable approaches to bio-waste in the years ahead.

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The #ForkToFarm project received the national Farm to Fork Academy Award for Environmental Protection and Biodiversity, recognising the project's contribution to advancing practical, community-based bio-waste solutions.