HOW TO SET UP
WASTE MANAGEMENT
AT THE SOUM LEVEL

GUIDEBOOK

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INTRODUCTION

Since 2018, Ecosoum has been working on setting up a proper waste management system in Khishig-Undur soum, Bulgan aimag, with the initial and renewed support of The Asia Foundation. From 2020, Ecosoum's activities became a part of the "Sustainable Plastic Recycling in Mongolia" project funded by the SWITCH-Asia-II program of the European Union[1], in partnership with four other partners working at the aimag and Ulaanbaatar level.

Although waste management in Khishig-Undur soum still has a lot of room for improvement to tend towards zero-waste at the soum level, accomplishments of the past three years are now sufficiently tangible to consider adequately-adapted replication in other soums of Mongolia. In any case, as Ecosoum has been regularly contacted for advice and guidance by soum administrations, grassroot organizations and motivated citizens from all over the country, it seemed essential to produce practical guidelines and recommendations to help soum-level actors to set up their waste management system.

Based on the lessons learnt from Ecosoum's work and experience, this guidebook aims to provide such guidance and advice. Aiming to be as practical as possible, regular reference is made to other documents produced by Ecosoum over the past three years through our efforts in Khisig-Undur soum. Overall, this guidebook is structured to provide step-by-step guidelines to establish a relevant waste management system at the soum level. The report is addressed primarily to soum administrations, which are in charge of local waste management; but, more broadly, it will also benefit to all soum-level actors willing to take action and improve the waste management situation in their soum.

1. EVALUATE THE CURRENT SITUATION AND UNDERSTAND YOUR WASTE

In order to set up a proper waste management system, it is essential to understand the types of waste you will manage. It means a proper baseline study must be conducted before taking any concrete action. This study should clarify all the information that will affect the design of the new waste management system. In other words, you need to thoroughly understand the current situation of waste in your soum.

LEGAL FRAMEWORK

Understanding the legal framework will also help you to design a relevant and applicable system, and avoid unnecessary administrative problems in the future. Knowing the National Law on Waste is a starting point, although it decentralizes the responsibility to design a locally-adapted waste management scheme to soum administrations. Aimag authorities' decrees should also be assessed to make sure that future actions taken at the soum level are consistent with and authorized by provincial regulations.

At the soum level, two kinds of legal frameworks should be considered: Municipal Council (the civil representatives) decrees and soum administration's Waste Management Master Plans. While the

[1] www.switch-asia.eu/project/sustainable-plastic-recycling-in-mongolia/

first is voted by local representatives and intended to set the ground rules for waste management in the soum, the latter is supposed to be designed by the soum administration to detail how waste should be managed practically. Master Plans are meant to be renewed every four years.

In order to assess the legal framework applying to your soum, you should read and summarize key information of all applicable decrees and Master Plans from aimag and soum authorities. You should also organize a meeting with relevant administrative actors (Municipal Council's representatives, soum Mayor, Head of administration, local Rangers) to fully grasp the legal framework and to understand whether administrative and/or political issues may affect the current or future legal framework.

Although designing and enforcing a Waste Management Master Plan is mandatory for local administrations, many soums do not have such plans. When they do, it is common that they contain a significant amount of unrealistic data and unapplicable rules. In any case, enforcement of the Master Plan is rarely extensive and systematic.

For these reasons, the current legal framework should not be seen as a significant constraint, even if unrealistic or unfavorable to improvements. On the contrary, local authorities will likely be willing to renew this legal framework if a more applicable plan is to be designed. Understanding the gap between what is and what should be will only help you work more effectively and produce relevant recommendations for improvement.

WASTE MANAGEMENT ACTORS AT THE LOCAL LEVEL

Officially, the soum administration is in charge of waste management. However, this statement does not say much about who specifically is in charge of what, not to mention that many other actors can be involved in different ways. It is even more essential to grasp who in practice plays which role with waste in the soum than understanding the legal framework which remains essentially theoretical.

A proper assessment should at least answer the following questions:

- Who is officially in charge of what among local administration's staff? (Usually, the Head of administration and Rangers are directly involved.)
- Besides administrative staff, who is practically in charge of handling waste at different stages (such as collecting waste, emptying public bins, and so on)?
- Has local administration mandated private actors (private companies, subcontracted handymen, etc.) to take care of some waste management activities?
- Is there an informal sector (waste pickers, scrap-dealers, etc.) involved in some stages of waste management within the soum?
- Are there NGOs or CSOs currently working on waste issues within the soum?

Interviewing soum administration's key staff such as Head of administration and Rangers is a good way to start. Additional interviews should also be conducted with all identified waste management actors to understand in detail who is doing what. An extensive assessment should lead to identifying key stakeholders and grasping whether there are some personal interests and hidden agendas that may affect the design or proper enforcement of an effective waste management system.

CURRENT WASTE MANAGEMENT SYSTEM

Along with a mapping of local actors, it is essential to perfectly understand how waste is currently managed at all stages within the soum. Such an analysis is of paramount importance because it will highlight what is already working well and what needs to be improved. A good assessment of the current situation will help you prioritize your objectives and define the new waste management system based on local context, constraints and challenges.

Although the following list is not meant to be exhaustive, you should at least investigate and find answers to questions such as:

- Who are the main waste producers within the soum (households, public institutions, private businesses, etc.)?
- How are each of these waste producers currently handling their waste?
- Is anyone currently sorting waste? What is done with this sorted waste?
- Are there intermediary collection points or bins in the streets? Are they emptied frequently enough, and by whom?
- Does local administration or any other actor organize waste collection and transportation? Under what conditions and following what patterns?
- Is there any waste recycling or reusing activity within the soum? How and by whom?
- How is the ultimate waste disposed of? Where, by whom and in what conditions?
- What waste management equipment is currently available within the soum? Is it owned and operated by local administration or other actors?
- Are there public cleaning operations? At what frequency and organized by whom?
- Is there currently any waste management-related tax collected in the soum? How much is it? How is it perceived? What service is this tax supposed to cover exactly?
- How do people feel about the current waste management system? What does each category of stakeholders expect to be improved? Who are the most concerned and motivated actors who can help set up the new system?

Overall, this assessment of the current waste management situation will be the cornerstone on which you will design your new waste management system. Thus, it is extremely important to conduct your investigation extensively (forgotten details may lead you to carry out inadequate actions), and honestly (distorting reality to hide past mistakes or protect personal interests will deteriorate your ability to set up a relevant system). As the situation can be very different for sedentary people in the village and for nomadic families, don't forget to include herder households in your study as well.

Although reading existing reports may help you to some extent, you need to carry out interviews of a wide range of local actors, from households to representatives of public institutions and private businesses. Only by multiplying discussions and crossing information will you eventually understand the current situation (including people's expectations and potential obstacles) sufficiently. You need to address your questions directly to the people who are handling the waste (for example, cleaners) instead of discussing only with directors and managers (who usually only have a detached and theoretical understanding of the ground situation and problems).

Preparing questionnaires adapted to each category of stakeholders in advance will help you conduct your interviews properly and collect all the necessary information.[2] However, your discussions should not be limited to mechanically asking the pre-established questions: questionnaires should be seen as an outline, so that you do not forget any important aspect of the subject, but you should always rephrase and ask for clarifications if something is not perfectly clear. As much as possible, you should also ask your interviewees to show you what they are explaining to avoid misunderstandings (for example, visit the waste storage rooms, look at the bins and other equipment used, etc.). Finally, do not forget to take pictures of everything.

DATA ABOUT WASTE PRODUCTION AND COMPOSITION

In addition to understanding *qualitatively* how waste is currently managed, you need to precisely estimate *quantitatively* how much waste is currently produced within the soum in order to be able to size your new system adequately. If you are lucky, data about waste is already collected by the Local administration, so you already have the information you need. Most likely, data collection is only partial (if existing) and not entirely reliable. In any case, we recommend carrying out a new quantitative evaluation to confirm or correct existing figures and establish brand new reliable data.

The most essential data to produce is twofold:

- How much waste is currently produced within the soum?
- What is the composition of this waste, for each type of waste producer?

Interviews of all stakeholders may bring you some semi-quantitative data based on interviewees' estimations. In case actual measurements cannot be carried out, this semi-quantitative information can already be helpful if you can handle it with a critical spirit and find ways to corroborate the data (at least orders of magnitude) via other sources of information.

Whenever possible, actual measurements are preferable. For each category of waste producers, you should weigh each type of waste (plastic, glass, paper, ash, etc.) with a scale and enter data properly in an Excel table. Data collected among adequately selected samples can easily be extrapolated to the entire soum to provide reliable orders of magnitude. Measurements should be linked with a brief contextual interview to enable interpreting results correctly.

[2] Note that questionnaires should be adapted to each category of waste producers, so that the questions enable grasping the specificities of each group. For our study, we prepared dedicated questionnaires for the following groups: soum-center inhabitants, nomadic herder households, soum authorities, public institutions, shops and other businesses.

For locally-based actors, conducting such a campaign of quantitative data collection can be virtually costless. It only requires some time and a predefined suitable methodology. For more details about how to conduct this kind of investigation, you can refer to the waste composition studies conducted by Ecosoum in Khishig-Undur in 2019 and 2020.[3] Comparing your results to those found in Khishig-Undur can also help you confirm your data (or offer approximative orders of magnitude if you can't measure everything yourself in your soum).

MAIN OUTPUT OF THIS EVALUATION PHASE

At the end of your investigations (qualitative interviews and quantitative measurements), you should possess all the necessary information to fully understand the waste situation in your soum. All this information should be regrouped in a dedicated *baseline report*, which should emphasize the main findings and key issues. It can also include your first general suggestions and recommendations, to be discussed with other stakeholders.

We recommend that you share the first draft of your report with key stakeholders in the soum to confirm that the information included does reflect reality and to reduce the risk of misunderstanding. Once the report is finalized, you should spread it as much as possible among all local actors and populations. Organizing public discussions based on the findings in your report may also help you for the next phase, which is to design the new waste management scheme for your soum.

Early 2021, after conducting extensive investigations over the previous months, we produced such a baseline study report for Khishig-Undur soum.[4] The report presents our findings regarding all the aspects of our situation as explained above: legal framework, waste-related local actors, current waste management processes and others. We detail the information brought up by qualitative interviews and quantitative measurements for each category of waste producers: this information is extensive enough to estimate waste production and composition, to present the level of awareness and waste management habits, and to clarify the needs expressed by each of them to improve the current situation. The report ends with a summary of the key issues and our main recommendations to improve waste management in Khishig-Undur soum.

Even though the situation is surely different in your soum, going through our report will help you grasp the kind of information you need to find and the type of document you should produce. A comparison between your soum and ours can also offer an interesting perspective.

[3] Waste composition study reports and factsheet are available, like all Ecosoum's resources and reports, on our website: www.ecosoum.org/en-resources-and-reports

[4] The summary report of our *Waste management baseline study in Khishig-Undur* (01/2021) is available on Ecosoum's website.

2. DESIGN YOUR NEW WASTE MANAGEMENT SCHEME

WHAT IS A WASTE MANAGEMENT SCHEME?

After you produced your baseline study and have a thorough understanding of the current waste management situation in your soum, it is time to draft a new waste management scheme. It means that you need to design and write down how waste is to be managed in your soum by all stakeholders in detail.

If your baseline study showed that the situation is not so bad already, you may want to simply improve your existing local Master Plan. On the contrary, if, like in Khishig-Undur, you are basically starting from scratch, it is probably simpler to design an entirely new scheme.

If you are a member of local administration and officially in charge of waste management, you can work directly on the soum's Waste Management Master Plan. If, like Ecosoum, you are not an official representative of the local administration, you can produce a recommendation report addressing all the key topics that, according to you, are essential to properly manage the soum's waste (then you can present your report to local administration and help their staff to turn your recommendations into the official Master Plan). In any case, the following recommendations should guide you to design your soum's waste management scheme.

Whether you have to improve an existing scheme or to design a brand-new one, we recommend that you build on existing local habits (whether informal or institutionalized) as much as possible. Changing habits is always difficult for most people; thus, even though major changes are necessary, you need your new waste management processes to remain as close as possible to what people are already used to (to increase your chances of acceptance and implementation).

To come up with a comprehensible and effectively implementable scheme, you need to reflect on the entire waste management chain (from the moment it is produced by waste producers to the point where waste is ultimately processed) and include the description of each stage in your scheme. Anyone should be able to fully understand each step of the waste management chain simply by reading the scheme.

The following sections detail the most important aspects of waste management that you should consider. You can refer to our recommendation report for waste management scheme[5] in Khishig-Undur for more detail about the options we chose for our soum and how we wrote our recommendations.

AT-SOURCE SORTING

Proper waste management requires processing each kind of waste separately because the solutions for each category of waste (plastics, glass, etc.) are all different. It means that the first essential step in any waste management system is always proper sorting at the source, meaning directly by waste producers in their homes and workplaces.

[5] Our *Recommendation report for waste management scheme in Khishig-Undur* (04/2021) is available on Ecosoum's website.

The level of sorting you want to require from waste producers is up to you: you may demand people to sort extensively into many subcategories (to reduce the amount of subsequent sorting work at waste management facility) or let people sort only by main categories (which has the advantage to make it simpler for people but will require more work for your waste management staff).

Both sorting options (by subcategory or main category) are perfectly valid, so the best choice essentially depends on the way you plan to operate the next stages (waste collection, transportation, etc.) and how concerned and involved you assessed waste producers are in your soum (if people are very motivated to improve the situation, you may easily ask them to sort extensively; if they are reluctant, you may ask only the minimum).

The following are the main categories of waste according to which it is essential to sort:

- Recyclable waste;
- Organic and food waste;
- Ash;
- Hazardous waste;
- Ultimate waste.

The reason these main categories represent an essential waste sorting minimum is that if any of them are mixed, they become impossible to separate and thus to process properly. We will detail below (in Chapter 3) the different categories of waste that can be considered "recyclable" and how each of them can be managed.

We strongly recommend that you make it mandatory for all waste producers in the soum to sort their waste. Sorting waste is a rather easy process, not to mention a legal obligation in Mongolia, so there should be no exception and no excuse not to sort waste at least by the main category. "All" waste producers should include soum-center households, nomadic herder households, public institutions and private businesses.

Waste sorting equipment can be different for each type of waste producer, depending on their needs and how you plan the next stages in your waste management scheme. Each waste producer should be free to decide the most suitable way to organize waste sorting in their premises, as long as their choices enable the type of sorting that is officially enforced. Your baseline study should have highlighted the kind of equipment that each type of waste producer considers necessary for themselves.

In any case, waste sorting essentially requires having a bin or a bag for each category of waste, which is why it is very simple to implement for anyone motivated to do so.

If local administration has sufficient means or access to external funding, it can be relevant to purchase (or manufacture) and distribute sorting equipment to some or all of the waste producers. Providing sorting equipment can be a good way to motivate people and make them formally commit to sorting their waste. For instance, in Khishig-Undur, we manufactured sorting bins for households and provided one to each family who pledged to sort their waste in the soum-center. However, if financial resources are too limited, it is perfectly possible to sort waste with simple bags and/or card boxes, which are virtually costless. As such, lack of equipment and financial resources should never be considered as an excuse not to sort waste.

WASTE COLLECTION AND TRANSPORTATION

Organizing a proper waste collection and transportation system is always complex, especially if waste producers are sorting their waste (which needs to remain separated in collection/transportation trucks). Failing waste collection systems are usually the first obstacle to proper waste management, especially in cities. Collecting waste has advantages, but it also comes with disadvantages. Therefore, organizing door-to-door waste collection should not necessarily be considered as an absolute obligation for a local administration.

When it comes to planning waste collection or not in your new waste management scheme, we recommend building on your existing system: if local administration is already collecting waste and the local population would consider it unacceptable that collection service is not carried out, it is certainly best to continue collecting waste; if the population is currently not having their waste collected and habituated to disposing of their waste by themselves, it might be preferable not to organize a collection service.

If the collection service is organized, you need to make sure that it does not jeopardize the at-source sorting effort. In other words, waste needs to be collected by sorted category: it is essential not to re-mix sorted waste in collection trucks.

If you want to collect several categories of sorted waste in a single truck, make sure to properly organize several compartments in the truck so that different categories are not mixed. Also, make sure that waste producers are well aware that you keep their waste separated: if people don't see the compartments in the truck and start thinking that collection services are mixing all their sorted waste, it will discourage people from sorting at source. Proper information and communication between all stakeholders are thus essential.

You can decide to organize waste collection services only for specific categories of waste producers (for instance, public institutions). In such case, make sure that everyone understands your decision to avoid creating frustrations among people who don't benefit from waste collection. Organizing public meetings and/or surveys can help you define the best and most acceptable option for all stakeholders.

If you want to organize waste collection for some or all waste producers, you can use this service as leverage to improve at-source sorting. For instance, you can offer to organize collection only (or more frequently) for sorted recyclables (not ultimate waste), which should encourage people to sort more and produce less ultimate waste.

You may also have the idea to set up intermediary collection containers, in which waste producers would drop their sorted waste and from which local administration would organize collection and transportation. However, we do not recommend this option because access to uncontrolled intermediary collection containers tends to lead people to sort and dispose of their waste unproperly. Public sorting bins in streets are a good example of this tendency: no one ever seems to respect the dedicated sorting compartments, so waste in these bins is always totally mixed up.

Overall, we recommend avoiding unmonitored collection locations such as sorting containers in streets. On the contrary, we recommend creating as much interaction as possible between waste producers and waste management staff. Not only the latter should be able to teach people how to sort their waste properly (ensuring a form of control), but also enabling discussions between waste producers and managers will increase the level of mutual respect and understanding and improve the commitment of waste producers to properly sort their waste – which will contribute to better overall waste management.

In Khishig-Undur, we recommended not to organize a waste collection service, at least not until all waste producers sort their waste perfectly. People were already used to not having a collection service, so they had no problem accepting to bring their waste by themselves to the waste management facility (instead of disposing of it in the dumpsite as they used to). This option allowed us to limit the complexity of our waste management system and increase the level of interaction between waste producers and waste management staff, who are frequently interacting at the waste management facility.

WASTE MANAGEMENT FACILITY

Regardless of the choices you make for all other aspects of waste management, you need to set up a waste management facility. This facility is an absolute necessity and the cornerstone of any proper waste management system: it is the place where you will collect waste, sort it into relevant subcategories, organize the export of valuable recyclables or even recycle yourself. There is no way to properly manage waste at the soum level without a dedicated building. Therefore, you need to find means to set up this facility in any case.

There are two main options for the location, which both have advantages and disadvantages. The first option is to set it up at the entrance of the soum's main dumpsite/landfill. This option has the advantage of increasing the possibility of control over the landfill, as there will always be trained staff around, in the facility. Incidentally, it is quite convenient to regroup the locations where recyclables will be processed and ultimate waste will be disposed of. The main disadvantage lies in the distance from the soum. If you don't organize collection services, it can be annoying for waste

producers to drive to the facility, and if the area is not connected to the electricity grid it could be very expensive to set it up.

The second option is to set up the facility closer to or even inside the village. From a legal standpoint, you will probably have to choose a site in the "industrial" area of the soum, but it should remain much closer to habitations than if you set your facility by the landfill. Proximity will facilitate access for people who do not have vehicles and smoothen communication and exchanges with waste producers. However, this option will weaken control over the landfill, which can be problematic.

If you have a choice and unless your local context dictates otherwise, favouring option one (facility close to landfill) will probably facilitate your overall waste management system (both for control/safety and logistical reasons).

Of course, if you already have a suitable building dedicated to waste management, you can use it even if it does not exactly fit our description and suggestions. In the same way, if you don't have a waste management facility but your soum does not have the financial resources to build a new facility, you can use any premises at your disposal. Your waste management processes can be adapted to the space you have, so feel free to select the best location already existing/available if budget is an issue.

Note that setting up a waste management facility is supposed to require prior administrative authorization based on an Environmental Impact Assessment. However, at soum level, the risk of creating pollution at the waste management facility should be very low if you plan and operate it properly. Thus, the authorization process is relatively short and this formality is carried out at the provincial level by the public administration. We recommend that you contact the Environment and Tourism Department of your province early enough in the process: they will provide you with a detailed list of the documents that you must submit to them to get a formal authorization to set up your facility.

The way you will organize the premises of your waste management site (both inside the facility and outside around it) should be adapted to your local context and the design of your overall scheme. You should consider whether or not (or, more precisely, which part of) the facility is accessible to the public, after having reflected on constraints such as transportation, access, logistics, etc. Inside the building, you will essentially sort waste and possibly recycle some of it, so you need to plan enough space for these two activities (including containers, sorting tables and machines). A professional architect can help you design the building to best suit your needs (in fact, an official architect blueprint should be one of the documents to submit to the administration for authorization).

In Khishig-Undur we built a 70m^2 facility, to which is also attached a storage room and a garage (45m^2 each). All waste producers in the soum are asked to bring their waste to the facility (both their sorted recyclables and their ultimate waste) and to put each type of recyclable in a dedicated bin. Each category of waste is then further sorted and processed by our waste management staff

depending on the processes planned in our scheme (Chapter 3 presents how we recommend processing each type of waste). Users (waste producers) have only access to a limited part of the premises, but the entire facility design enables them to see how the local staff is processing waste (in order to increase the level of understanding and awareness). In return, local staff is meant to always remain available to help and advise people who come to drop their waste at the facility.

For more details about our waste management scheme in Khishig-Undur, you can refer to our previously mentioned reports. There are ideas that you can directly replicate in your soum, although you may need to adapt some aspects to best match your local context and needs.

LANDFILL

No matter how much you manage to have your soum's waste sorted, a landfill will always be necessary to dispose of the remaining ultimate waste. If properly managed, this landfill can be relatively small (a few hectares maximum, possibly even less). In theory, a proper landfill would require digging a large hole, making its bottom waterproof with thin clay and plastic layers, collecting and managing lixiviates and methane emissions, etc. Unfortunately, all these state-of-the-art processes are inapplicable in Mongolian soums, first and foremost for financial reasons.

Nevertheless, basic measures can be taken to reduce the risk of pollution and keep the local landfill decent. Making the bottom waterproof is not a realistic objective, especially because it would require setting up an even less realistic lixiviate management system. However, fencing the landfill (if possible, with an embankment) should be considered a minimum to keep livestock and unauthorized people from entering.

We recommend that access to the landfill should be strictly limited to properly trained waste management staff. All waste producers should never go to the landfill but bring their ultimate waste to the waste management facility along with sorted recyclables (unless a collection service is organized), and dedicated staff alone should take ultimate waste from facility to landfill. Exceptions could sometimes be made to this grand rule, but we recommend that waste management staff are always present to help and control when waste producers have to dispose of waste directly at the landfill.

The other essential aspect of landfill management is to frequently cover the disposed waste with soil or any other suitable material (coal ash from a central heating plant may be a good option in soums) to prevent wind scattering of light-weight polluting waste such as plastic bags.

You need to dispose of ultimate waste in a limited area of the landfill, make a pile and cover it as often as possible. Once a waste pile is covered, start a new one next to it and repeat the process to keep the landfill organized and safe. A small bulldozer is an essential machine for proper landfilling as it allows to move and regroup disposed waste before covering it with soil (which is almost impossible to do without a bulldozer).

Finally, it is very important never to burn waste in the landfill (or anywhere else). Burning waste can sure help reduce the volume of ultimate waste, but it produces extremely toxic smokes (dioxins, furans, etc.) that are very dangerous for human and animal health (in the long term, it can significantly increase the risk of cancer and other severe diseases).

Regardless of any national and provincial laws authorizing waste-burning in some circumstances, we strongly recommend that you never burn any waste (except paper and carton if necessary) in your soum to protect the health of your population.

WASTE MANAGEMENT STAFF

Full-time dedicated waste management staff must be hired and based at the waste management facility to manage the soum's waste. This civil-servant staff will be in charge of various waste management tasks. When users come to drop their waste, the staff can help them sort and dispose of their waste in each dedicated container and bag, and give proper guidance and recommendations if people make mistakes and their at-source sorting needs to be improved. When users are not here, the staff will be finalizing waste sorting and process each category of waste according to the pre-established schemes (including recycling if applicable). The staff should also be in charge of disposing of the ultimate waste in the landfill and ensure proper landfill management.

You should adapt the number of full-time dedicated waste management staff to ensure the proper conduct of your scheme, which means that at least one person should always be present in the facility during working hours.

Having sufficient dedicated staff is essential to ensure proper waste management because there are many tasks to carry out. That is why it is not enough to just ask your existing subcontracted handymen to take care of waste management tasks, once in a while when they have time. Proceeding with insufficient staff is one of the main reasons why soum-level waste management system usually fails. Thus, it is essential to employ enough dedicated staff who shall be exclusively in charge of waste management.

If you want the facility to be open every day (including weekends, which is usually when most people have time to bring their waste to the facility), it means that more than one staff should be employed. This way, they can take turns for weekend shifts and one can always remain in the facility while the other carries out waste management work outside of the premises (landfill work, empty street bins, transportation of valuable recyclables, etc.).

Overall, we recommend employing at least two full-time staff for the waste management facility. If you organize a waste collection, at least one more staff will probably be necessary if he/she has to spend most of his time out of the facility, driving the truck in the village.

PUBLIC SERVICE, BUDGET AND TAXATION SYSTEM

Besides the initial investments (building the facility, purchasing machines, etc.), managing waste requires money to pay for running costs, the salary of staff, maintenance of equipment, and others. Delegating the waste management system to private operators and/or counting exclusively on the trade of valuable recyclable waste to cover all expenses are common recommendations nowadays. However, even though these solutions can be tempting, we strongly disagree with them because this private sector-based approach would not be resilient and sustainable for several reasons.

Although selling recyclable waste to urban recyclers can be profitable to some extent under the right conditions (especially if your soum is located close to Ulaanbaatar), there are limits and risks. If a soum's waste management system relies exclusively on trading its profitable recyclables, it is too dependent on market prices which are known for their instability. For instance, if the international oil exchange rate increases, the whole profitability of transporting recyclables from your soum to Ulaanbaatar could collapse, and your soum's waste management system with it. Similarly, if urban recycling industries are overwhelmed with recyclables, the purchasing prices may decrease, which would also impact your soum's waste management sustainability. In light of these risks, favouring local management and recycling (at least some part of the waste) may be less profitable, but it will be more resilient in the long run.

Another important resilience and sustainability factor lies in the public service nature of a local waste management system. A private operator may have an interest to take care of the most profitable recyclables (some middlemen already roam soums to buy metal waste), but he/she would most likely show no interest in other types of waste, which would therefore not be managed properly in the soum. More broadly, for a local waste management system to be sustainable, profit made out of the most valuable recyclables should not exit the system to end in private operators' pockets, but it should be used as an ongoing investment to manage other less profitable recyclables and worthless ultimate waste properly.

In order to establish an effective, resilient and sustainable waste management system in a soum, we strongly recommend that local administration (if relevant, in cooperation with other non-profit operators) always remains in charge of all aspects of local waste management, which should be strictly considered as a public service (just like the municipal school or the local hospital).

For the same reasons, although we are in favour of some forms of incentives (which need to be well reflected and discussed), we strongly recommend avoiding monetizing waste and purchasing recyclables from waste producers at the soum level. If the entire waste management system is based only on personal economic interest rather than eco-friendly consciousness and civic behaviour, changes in market prices could lead to the collapse of the entire system. If for any reason you could no longer purchase recyclables from local waste producers at a price that interests them, they would simply stop sorting their waste and it would be the end of proper waste management.

Incidentally, purchasing recyclable waste from waste producers (instead of just receiving it for free) would increase waste management expenses unnecessarily, and thus decrease the financial viability of the waste management system. Not to mention that introducing money exchange in

everyday waste management could become a logistical nightmare for waste workers and local administration. Last but not least, offering money to waste producers in exchange for their waste would not encourage them to reduce the amount of waste they produce in the first place (which should always remain the main goal when we talk about waste).

We recommend that local administration (and its delegated non-profit waste management operators) never purchase any recyclable waste from local waste producers. People should sort and manage their waste properly not for their economic individual benefit but civic and ecological reasons. Chapter 4 will clarify how awareness and civic involvement can be increased.

Although, for the previously mentioned reasons, we don't recommend funding the entire waste management budget of the soum on trading profitable waste, selling valuable recyclables to urban recycling industries can bring useful income to some extent. It is unlikely that it would cover all waste management-related expenses; however, along with the soum's yearly finances and a dedicated local waste management tax, the trade of recyclables could help balance the waste management budget.

It is impossible to define a precise and relevant budget before conducting your baseline study and designing your waste management scheme because incomes and expenses can vary greatly from soum to soum depending on many factors. However, we suggest considering the following as a rough base:

- **Use the waste management yearly budget of your soum administration (along with external funding if you can find some) for main investments (buildings, machines, etc.).**
- **Use the profit from trading recyclable waste to cover waste management running costs (maintaining equipment, electricity and heating of the facility, fuel for transporting valuable recyclables, etc.).**
- **Use a local waste management tax to cover the salary of waste management staff (and waste collection system if you want to establish one).**

As mentioned above, it seems that establishing a dedicated waste-related local tax is necessary to economically balance a fully functioning waste management system (especially if it includes a waste collection service). The issue of waste management taxation is complex and sensitive as it requires to be simple enough to enforce (to make sure administration can effectively manage to collect taxes) and fair enough to be accepted by all inhabitants (to make sure everyone agrees to pay as willingly as possible) at the same time.

The first ground rule for the waste management tax is that it should be paid *beforehand* by all waste producers. Think of it this way: we all pay taxes to fund our national education system *beforehand*, not individually when each of our children goes to school. The same systemic public service logic should apply to waste management.

The best way to collect the tax should be determined with/by the soum administration, taking administrative and practical constraints into account. An efficient and easy way is probably to collaborate with the national tax office and/or the electricity payment system. For example, if the local waste management tax is paid systematically with the electric bill, it will be fairly simple to collect.

The adequate tax amount depends on many factors among which the total expenses you intend to cover with it (as well as how you plan to divide it between waste producers). However, if you follow our suggestion to use the tax essentially to cover the salary of waste management staff, it becomes quite easy to calculate: once you have defined the number of staff you need and what their salary should be, the average tax to be paid by each waste producer simply corresponds to the total gross salary divided by the number of waste producers.

However, it would not be fair to ask each waste producer to pay the same tax. Differences should be applied at least by the main category of waste producer (herder households, soum-center households, public institutions and private businesses). The tax amount should also be different if the waste management services provided to each waste producer are systematically different (for instance, if some benefit from the waste collection while others don't).

Overall, the following suggestions should be taken into account:

- herder households should probably pay less than soum-center households as they usually produce less waste and live far from the waste management facility (which tends to increase their waste transportation costs and reduce the waste management services they have access to);
- private businesses should pay a specific tax (even if the business is run on household premises) as they will create "professional" waste in addition to "domestic" waste. A difference should also be made between businesses depending on the amount and hazardousness of waste they produce (for example, tax should be higher for an industry that produces large amounts of toxic waste compared to a small business that only produces a small amount of non-hazardous waste).

In addition to these differences between categories of waste producers, a fair tax should also recognize differences between households, based on parameters such as:

- Number of people in the household (more people producing more waste);
- Total income of households (waste tax should not be an unbearable burden on the poor households while wealthy one could easily pay more with the community's best interest at heart);
- Amount of waste production (taxation should encourage people to reduce waste production);
- Level and quality of waste sorting (taxation should encourage people to sort their waste).

Overall, considering all the relevant factors that differentiate each waste producer (between categories and among each category), introducing a waste management tax that is truly fair to everyone is almost impossible. Nevertheless, it is important to try and take them into account as much as possible for the tax to be as fair and acceptable as possible.

Given the practical difficulties that may arise from trying to establish an individualized tax within each waste producer category, we recommend starting with a flat tax specific to each category (same tax for all herder households, same tax for all soum-center households, same tax for each business, etc.). Then, when the taxation system is effectively implemented and the main practical obstacles are overcome, the tax should be progressively modified towards more fairness for each taxpayer. Public meetings should be organized once in a while to discuss with the population how they perceive the tax and how they think it could be improved (at least one meeting should be organized before the tax is established in the first place to introduce the idea and take the most relevant comments into account).

MAIN OUTPUT OF THIS SCHEME DESIGNING PHASE

When you are done designing your waste management scheme after reflecting on every aspect and involving the local population in making choices and decisions as much as possible, you should formalize the scheme in the soum's Waste Management Master Plan. (If you are not part of the local administration, you can produce your report and then advocate for your soum's administration to include your recommendations in the Master Plan). The Master Plan with the new scheme should be as clear, practical and detailed as possible.

At this point, the new Waste Management Master Plan should be endorsed and formally become the new regulatory framework, applicable to everyone in the soum. Local administration mustn't satisfy itself with a good Master Plan that is not enforced daily. It means that a planned budget must effectively be available and dedicated staff should not be requested to carry out other missions.

It also means that after ensuring sufficient communication about the new scheme among the entire population, local administration should not be afraid to fine waste producers who do not respect its rules, especially when it comes to at-source sorting (which should be strictly mandatory for everyone, as it is required by the National Law) and to littering and improper waste disposal (which pollutes the environment and is also strictly forbidden according to the National Law). In return, if local administration does not respect its responsibilities, concerned local citizens should step up and find ways and leverages to force local administration to carry out its duties.

3. MANAGE AND PROCESS EACH CATEGORY OF WASTE

CATEGORIES OF WASTE

Until here, we have discussed broadly how to establish an overall waste management scheme at the soum level. In other words, we made recommendations on how to ensure that all the waste produced in your soum (sorted at source at least by the main categories) does arrive at your waste management facility one way or another. In this chapter, we will go into more detail about each type of waste and offer broad guidelines and recommendations on how to process each of them.

As we previously mentioned, the minimum main categories of waste that must be sorted at source are: recyclable waste; food residue and other organic waste; ash; hazardous waste; and ultimate waste. These main categories can be divided and sorted into subcategories as follows:

- **Recyclable waste:**
  - **Hard plastics** (including PET bottles and other plastic containers);
  - **Soft plastics** (including plastic bags, packaging films and wrapping);
  - **Glass** (bottles and jars, broken and intact);
  - **Paper and carton** (without scotch and staple);
  - **Tetra Pak** (for milk, juices and other liquid);
  - **Fabric** (all kinds of old clothes and fabric cutoffs);
  - **Metal** (aluminium and iron cans as well as all other scrap metal);
  - **Electronic waste and batteries** (cables, broken devices and so on);
- **Food residue and other organic waste:**
  - **Vegetal waste** (vegetable peels, other green waste, etc.);
  - **Animal waste** (meat, bones, fat, food leftover, etc.);
- **Ash:**
  - **Wood ash** (with livestock dung ash if necessary);
  - **Coal ash** (strictly separated from wood ash);
- **Hazardous waste** (such as oils, paints, etc. – each type separated from one another);
- **Ultimate waste** (all remaining non-recoverable waste).

For some of these subcategories, further sorting is necessary at the waste management facility if you want to recycle, reuse or sell them to urban recyclers. However, if you do manage to reach the above-mentioned level of sorting, you should be able to process everything properly – provided that recyclable waste is relatively clean and not soiled with dirty substances.

At this point it is important to stress that in this report we use the expression “recyclable waste” in a very broad sense, essentially in opposition to “ultimate waste” (which is intended as waste that is not valuable/recoverable and can only be disposed of in a landfill). Therefore, please remember that here we include as “recyclable waste” some items and materials that are actually going to be reused or even waste that could or should be recyclable/reusable in theory although it is currently not the case in Mongolia.

In the next sections of this chapter, we suggest possible solutions for the proper management of each subcategory of waste. Our recommendations and suggestions are not meant to be exhaustive or exclusive: you may come up with relevant alternatives or solutions better adapted to your local context.

PLASTIC

Proper management of plastic is the cornerstone of any waste management system because it constitutes a large part of all waste and it is very harmful to the environment. It is thus important to put a lot of effort into plastics and, to do so, to understand a few basics about them.

TYPES OF PLASTIC

First of all, it is important to stress that subdividing plastics into "hard" and "soft" is an arbitrary subdivision that is only meant for most waste producers to easily pre-sort at the source. However, to be effectively recycled, plastics need to be further divided by type of material. In fact, the word "plastic" is merely a generic term that includes many different types of substances (polypropylene, polyethylene, etc.) that cannot or should not be mixed and need to be separated for proper waste management.

According to international standards, plastics are usually divided into seven main categories associated with a number. Some of them are usually found as "hard" materials (PET, PVC, HDPE), some essentially under "soft" forms (LDPE), which is why pre-sorting between hard and soft can be useful practically. In any case, if you want your plastic waste to be recycled, you'll need to sort it by category.

International identification codes of plastics

/1\ PET

PET (polyethylene terephthalate) is essentially used to produce bottles, and approximately half of all plastic waste found in soums are PET bottles[6]. These PET bottles themselves can be divided into two main categories: transparent (or slightly colored) bottles (mainly for water and sodas) and brown (or dark green) bottles (mainly for beer, usually referred to as "*unee*" in Mongolia).

Transparent water and soda PET bottles

Brown beer PET bottle

[6] This estimation is based on our findings in Khishig-Undur soum. The actual proportion of PET bottles and other plastics may be slightly different in your soum (your baseline study shall clarify actual figures), but it seems relevant to consider this rough estimation as a realistic approximation.

These bottles are very easy to identify as almost all drinks are sold in such PET bottles (with the notable exception of milk). In case of doubt whether or not you are dealing with a PET bottle, look at the bottom of the bottle where you will find the letters "PET" or the number "1" inside the triangle recycling symbol (as shown above).

/2\ HDPE

HDPE (high-density polyethylene) is essentially used to produce other kinds of plastic containers, such as milk, motor oil, shampoo and conditioner, soap, detergent, and bleach. They can be colored although quite often they are white; in any case, they are rarely transparent like PET bottles, so it is fairly easy to distinguish them. Another big difference is while PET bottles are blown, HDPE bottles and containers are welded, which leaves a straight line in the middle of the bottom (which is absent from PET bottles). Usually, you can confirm by the letters "HDPE" or the recycling symbol with the number "2" (although sometimes these indicators are not marked on these containers).

HDPE containers and bottles

An identification number and welding line

/3\ PVC

PVC (polyvinyl chloride) is mainly used to produce construction materials such as sanitary pipes, window frames and other kinds of devices. As such, they are not often found in soum-level waste, except in demolition waste. From a soum-level waste management perspective, PVC is not a priority to focus on compared to other plastics.

/4\ LDPE

LDPE (low-density polyethylene) is essentially used to produce plastic bags and wrappings. It is rare to find an identifiable mark (letters "LDPE" or symbol with the number "4") to confirm the type of plastic, but most of the grocery bags and plastic wraps and films are made of LDPE. A simple ripping test can help confirm you are dealing with LDPE: if you pull on the plastic and try to tear it apart, it will extend for a while and end up ripped chaotically (as opposed to PP that will barely extend and cut in a straight line).

LDPE bags and wrappings

Ripping test

/5\ PP

PP (polypropylene) is mainly used for food product packaging and it is the only type of plastic that is broadly found under both "hard" and "soft" forms. In "hard" form, it is usually used for food containers (for products such as jam or yoghurt) and disposable items (plates, bowls, cups, etc.). It can look quite similar to HDPE containers although it does not have a welding line in the bottom. In "soft" form, it is used to wrap various food products such as bread, biscuits, pasta and so on. As mentioned above, it is fairly easy to distinguish from LDPE wrapping as the texture is quite different and it does not react the same way to the ripping test (it breaks with a straight cut). For confirmation, you can usually find the identification letters "PP" or symbol with the number "5" on most hard and soft PP items and packaging.

Hard PP items

Soft PP items

/6\ PS

PS (polystyrene) is mainly used in the form of a white rigid foamy material either for its insulating or its shock-absorbent properties. At soum-level waste, we mainly find it in protective boxes, beads and pads.

PS protective items

/7\ OTHERS

All plastics that are not pure PET, HDPE, PVC, HDPE, PP or PS (categories 1 to 6) fall under the category "others" (number "7"). These "others" are usually mixes of different plastics, which makes them impossible to recycle and means that they will end up in a landfill. Lots of plastic items fall under this mixed category, but fortunately, at the soum-level, the majority of plastic waste remains identifiable as pure plastic belonging to one of the first six categories.

PRESS AND SELL YOUR VALUABLE PLASTICS

WHAT TYPES OF PLASTICS ARE CONSIDERED VALUABLE?

Depending on what you planned in your waste management scheme, you may want to sell some recyclable plastics to specialized urban recycling industries. This option appears particularly relevant for PET bottles because several industries, especially in Ulaanbaatar, have experience in recycling them and because recycling PET is not an easy process at the soum level without the proper equipment and expertise.

Several recycling industries have been purchasing PET bottles in Ulaanbaatar. Purchasing price can vary over time, so it is always necessary to check up on prices and maybe even to discuss terms with recyclers to negotiate better deals if possible. Until recently, the average price was approximately 500 MNT per kilogram, but lately, prices seem to have fallen to app. 250 MNT per kilogram (which is equal to 250,000 MNT per ton).[7]

Besides PET, it is now also possible to sell other types of plastics to specialized industries in Ulaanbaatar. It appears that an increasing number of professional recyclers purchase HDPE and LDPE. Purchasing prices have been varying significantly but in December, 2021, HDPE and LDPE were usually worth between 700 and 800 MNT per kilogram on average.[8]

In theory, PVC and PS can also be recycled to some extent, although it has not been done as broadly as other types of plastic. Lately, some industries in Ulaanbaatar seem to have started recycling them, so it may be a valid option depending on how much you find in your soum's waste. Purchasing price for pure PVC is app. 600 MNT per kilogram, but if other materials are not properly separated from it (for instance, if there is still metal from window frames), the price can come down to 200-300 MNT per kilogram. Purchasing price for PS is app. 500 MNT per kilogram.[9]

Overall, when properly sorted, most plastic waste can potentially be valuable in the right conditions. Therefore, the relevance of trading recyclables from your soum essentially comes down to resilience considerations and economic viability (linked with transportation costs).

[7] This recent 50% decrease in purchasing prices confirms the financial risks for a soum-level waste management system to rely on trading recyclables too much, as discussed in chapter 2.

[8] Contrarily to PET bottles, LDPE and HDPE purchasing prices seem to have increased over the last months of 2021. Prices indicated here are thus be considered a rather high price compared to normal.

[9] All prices mentioned in this report should be handled with caution and frequently double-checked as they are likely to evolve quickly, especially during this Covid-19 pandemic.

LOCAL PRESSING AND TRANSPORTATION

If you decide to sell some or all your sorted valuable plastic waste to urban industries, you will need to transport it properly, which means that you will need to process it slightly so it becomes easy to transport at a reasonable cost.

To do so, the easiest solution is to press the plastic into blocs, which is why we recommend that you acquire a press (to be installed in your waste management facility).

Such a plastic press is a relatively low investment: in 2021, a 20-ton press perfectly suitable for soum level was worth app. 5 million MNT. Considering this low cost compared to its advantages, this kind of machine is probably the first one to acquire when establishing a proper waste management system.

Example of plastic press

Pressed plastic

For transporting and selling plastic to urban recyclers, a press appears more suitable than a shredder for two main reasons: most urban recyclers usually seem to prefer to purchase intact items rather than shredded plastic (to ensure better control over the raw material), although it is not necessarily true for all of them; and, contrarily to shredded plastic, pressed plastic does not require bags or any other equipment to be transported (which makes it more convenient and reduces the risk of environmental impact in the process).

The economic viability of transporting and selling PET bottles or other types of plastics to urban recyclers essentially depends on two main factors: the purchasing price of PET bottles at a given time and the distance between your soum and Ulaanbaatar (which, along with the price of gas, linearly affects the transportation costs). So, you can easily calculate whether trading your PET bottles would be rather profitable, barely viable or not conceivable.

As transportation costs from a given soum to Ulaanbaatar is usually a fixed price (per ton), just compare this transportation price with plastic purchasing prices to see if the operation can be economically interesting for your soum. Considering the increasing number of professional recyclers, it is also possible that you can find recycling industries in your aimag center, which could reduce your transportation costs and increase the viability/profitability of the operation.

For instance, in Khishig-Undur (which is located 300 kilometres from Ulaanbaatar), transportation cost to the city is currently app. 100,000 MNT per ton, which means that selling plastic to urban recyclers remains an economically viable operation even though purchasing prices recently decreased significantly.

The requirements of the buyers are fairly simple: they usually only ask that plastics are properly sorted by type and are relatively clean. However, regarding PET bottles, they currently seem to accept only transparent bottles, neither brown nor green beer bottles.[10] Some industries may also ask that bottle caps (which are usually made of LDPE or PP) be removed beforehand.

SHRED AND LOCALLY RECYCLE SOME OF YOUR PLASTIC WASTE

If transporting part or all of your plastic waste to urban recyclers is not a good solution (either because it is not economically viable and/or because you prefer to process your soum's waste locally), it is possible to recycle some plastics relatively easily. In particular, LDPE, HDPE and PP are quite simple to recycle, so it can be a relevant option, especially if your soum is located far from Ulaanbaatar and transportation costs to urban recyclers is too high.

However, as previously mentioned, although PET is simple to recycle for specialized industries, it is not so easy to recycle for inexperienced operators (because its melting temperature is close to its burning temperature).

Overall, we tend to recommend selling PET bottles (as well as PVC and PS if you have a lot and can transport them at a reasonable cost) to urban recyclers and recycling PP, LDPE and HDPE locally. The relevance of this recommendation needs to be assessed depending on your local context: if transportation costs are extremely high because your soum is located far away, you may want to try and recycle PET bottles yourself; on the contrary, if you have easy access to professional recyclers who offer a good price, you may prefer to sell all your valuable recycles. Keep in mind that the best choices in a given period may evolve, so you should remain flexible and be ready to trade more or recycle more yourself depending on the evolving context.

The plastic recycling process is simple to understand: you first need to shred your (sorted and clean) plastic and then you need to melt it and reshape it into a new item. This two-stage process requires two different types of machines: a shredder (to cut the plastic into small flakes) and a recycler (to melt and reshape the plastic flakes).

[10] For the reasons explained in chapter 4, we still recommend to sort, press and temporarily store brown and green PET bottles, even if urban recyclers currently don't purchase them.

Example of plastic shredder

Example of plastic recycling machine (extruder)

A suitable shredder for soum-level costs approximately the same price as a press, i.e. app. 5 million MNT. Recycling machines such as extruders or sheet presses are usually more expensive, between 10 and 20 million MNT depending on the origin of the machine. If you have access to a skilled engineer, you can decrease the cost of the machines by manufacturing them yourself.[11]

If neither transporting recyclables to Ulaanbaatar nor acquiring recycling machines appear as financially realistic options for your soum (because transportation costs are too high to reach economic viability, or because recycling machines are too expensive), a good solution could be to coordinate with nearby soums. Sharing resources to jointly invest in adequate machines is a perfectly relevant approach for all soums. Collaborating with your aimag center may also be a good idea to facilitate coordination with other soums or even to centralize public recycling in your aimag-center.

GLASS

In soums, most of the glass waste is constituted of bottles (mainly vodka) and small jars (mainly from salads and sauces). Glass is an inert material, which means that it does not interact with its environment. In other words, it is not toxic per se, which in theory makes it less "pollutant" than other types of waste such as plastic. In practice, however, it is one of the main types of waste found in soums, which makes it a priority in terms of proper waste management. In addition, it is also important to keep in mind that, from an ecological perspective, the glass-making industry has big impacts on the environment as it uses a tremendous amount of (polluting) energy and requires to massively extract sand (the main raw material to make glass) from natural beaches. Not to mention that broken glass spread across the countryside can be dangerous, and degrade beautiful landscapes. Glass exposed to strong sun heat can start wildfires as well. For all these reasons, it is important to properly manage glass.

[11] If you understand English, machine blueprints and tutorial videos are available for free on Precious Plastic's website (https://preciousplastic.com - these recycling machines are the ones we have in Khishig-Undur).

In theory, there are three main solutions for glass management:

1. Facilitate reusing intact bottles and jars by food and beverage industries;
2. Recycle glass waste into new glass items;
3. Directly use glass waste for other purposes.

We recommend focusing all your efforts on favouring the first solution, i.e. to sell back your empty glass bottles and jars to industries so that they can directly reuse them. This option is by far the best, especially because it is much better for the environment as it reduces the need for energy and raw material to manufacture new containers or recycle old ones.

To this day, food and beverage industries are far from buying back all their bottles and jars, but some of them already accept to purchase the containers of their main products. Sometimes it is easier to sell the bottles and jars to intermediaries who will deal with the industries themselves. This intermediary approach can have the advantage for soum stakeholders to deal with a single actor when it comes to selling their reusable glass (instead of multiplying discussions with each food and beverage company), although such intermediaries usually offer lower prices than food/beverage industries themselves (because intermediaries take their share of the profit).

Purchasing prices of bottles and jars vary significantly from container to container, from app. 30-50 MNT (for jars and small bottles) to 200-250 MNT (for the most valuable vodka bottles). These prices also depend on who you are dealing with and the kind of deal you can negotiate. Of course, prices also evolve, which makes it difficult to estimate the value of a truck full of reusable glass to sell back.

In any case, keep in mind that although some bottles and jars may not be purchased now, the situation can evolve in the short or medium term. Therefore, unwanted bottles may soon become valuable on the market.

We thus recommend properly sorting and storing all the intact bottles and jars produced in your soum. Once you have a significant number of specific bottles and jars, contact the concerned brands or potential intermediary buyers to collect up-to-date information about whether they currently purchase them or not (and at what price). Then you will be able to evaluate whether it is economically viable, at that point, to transport and sell these bottles/jars to urban buyers.

According to our estimations (although it always depends on evolving price of gas and purchasing prices of glass), transportation costs of reusable glass containers can be covered by selling them if the distance between the soum and Ulaanbaatar does not exceed a few hundred kilometres. For soums located in remote provinces, it seems unlikely that selling glass back to industries in Ulaanbaatar can be an economically viable operation (if you have to bear the cost of transportation alone).

If you cannot reach an economical balance for transporting glass to Ulaanbaatar yourself, we recommend that you coordinate with your aimag center and/or nearby soums, to decrease transportation costs or find alternative solutions. Some food and beverage industries supply directly to some aimags and soums with their trucks, which may drive back empty to the industries. They could carry the reusable containers you want to sell back to them. Opening direct discussions with relevant food and beverage companies may also help find realistic solutions. In any case, we recommend that you keep sorting and storing your intact bottles and jars until you find an adequate way to sell them back.

Companies' requirements to buy back their glass containers are much stricter than for plastic because glass bottles and jars are meant to be directly reused while plastic is recycled into new items. Bottles and jars thus need to be in perfect condition, otherwise, companies cannot reuse them to commercialize their food and drinks.

We recommend properly storing sorted bottles and jars in carton boxes, with carton separators between each of them to avoid shocks, scratches and damages which may lead industries to refuse them. We also suggest that you use the same carton boxes in which bottles and jars were initially sold and brought to your soum. Coordinate with your soum's shops to make sure that you collect the boxes before they are destroyed, burnt, thrown or given away. Such a collection of fit boxes can be organized easily if you properly integrate this necessity in your overall waste management scheme.

For the glass that is not sold back for reusing (essentially because it is damaged or not demanded at all), the next logical step is to look for glass recycling factories. To our knowledge, there is currently only one operator in Mongolia (based in Nalaikh) that purchases glass waste for recycling. However, the purchasing price is extremely low: 30,000 MNT per ton (in 2021). This means that unless your soum is so close to Nalaikh that your transportation costs remain under 30,000 MNT per ton, this option is not economically viable (unless you cover part of the cost with the profit from selling more valuable types of recyclables).

For most soums, the only realistic solution for unsellable glass waste is thus to manage it locally. Intact jars may interest some locals (especially after the vegetable harvesting season, when people make pickled products). Most likely people will not buy them, but you should distribute the jars that were collected in the waste management facility even if it's for free, as it will decrease the amount of glass waste to manage.

Broken glass waste can be useful, especially for construction: for instance, properly shredded glass can be used instead of sand and/or gravel to make concrete. However, finding adequate and implementable solutions for your soum will probably require some research and experimentation. If there is no better applicable solution, the option to crush glass and use it as a backfill (or to cover other kinds of waste in your landfill) is always available. However, this solution should be considered as a last resort and temporary because, in many ways, it remains a total waste of valuable glass.

Crushing glass will require the same kind of machine as for shredding plastic (which costs app. 5 million MNT). Here again, coordinating with your aimag or neighbouring soums can help share investments (or even come up with relevant local outputs for glass waste).

PAPER AND CARTON

At the soum level, paper and cartons are not a real problem in terms of waste management. The first reason is that they are made of organic matter, which means that they naturally degrade very fast without polluting the environment (contrarily to plastic). When unproperly managed, the worst that paper and carton waste can do is to temporarily degrade landscapes.

The other reason is that they are usually produced in low quantity. Most households don't produce any and the little they have is usually used to start stove fires. Overall, paper waste is essentially produced by public institutions and carton waste mainly comes from shops (from their supply packages). However, the carton boxes are often given away to customers to carry their purchases (customers who, in turn, will either use the carton boxes for other purposes or burn them).

Although they do not pose a real danger, proper paper and carton waste management is still recommended because they are valuable resources with many relevant applications.

As previously mentioned, gathering all available carton boxes will be helpful in your waste management processes, especially to transport your valuable glass to Ulaanbaatar or elsewhere. Even if you don't set up a waste collection service, it might be relevant to plan a punctual collection of carton boxes from the main shops in your soum. If not reused directly, paper and carton waste can be useful in many other ways. For instance, they can be used as carbon matter for dry toilets. More broadly, they can be useful for composting (see below about organic waste composting).

Paper and cartons are also recyclable: they can be transformed into new paper and cartons. In Mongolia, there are paper recycling factories and some intermediaries that collect paper waste. However, the purchasing price is rather low (app. 50 MNT per kilogram for white paper and app. 20 MNT for carton) and it is required that all staples and scotch are removed at source (which can be time-consuming). So, this solution is not necessarily very convenient and economically viable, especially for remote soums. Nevertheless, if your soum is located close enough to Ulaanbaatar and produces a lot of paper waste, selling it to paper recyclers can be relevant.

Finally, note that if you can neither find a useful local application for paper waste nor transport it to Ulaanbaatar for recycling, you can always burn it. Although burning large amounts of paper is a waste of valuable resources, it is the only kind of waste you can burn without harming the environment (because it is organic matter which mainly comes from wood). If you have to burn paper and cartons, try to find a relevant energy-production application rather than lighting fires to no avail.

TETRA PAK

Tetra Paks are produced in even lower quantities than paper and cartons. However, contrarily to the latter, they are a real waste management problem and raise environmental issues because they contain not only cartons but also plastic and aluminium, which don't biodegrade naturally and require effective processing.

In theory, Tetra Paks are recyclable, but such a process requires advanced technologies to separate cartons from plastic and aluminium. As these technologies are not available in Mongolia, we can only consider that Tetra Paks are not effectively recyclable in our country. It is also a common belief that Tetra Paks have insulating properties. However, it is not clearly proven and more research is necessary to confirm it and find relevant applications.

To this day, there is no proper way to manage Tetra Pak waste in Mongolia. However, we still recommend sorting and storing Tetra Paks in your waste management facility, for the reasons explained in Chapter 4.

FABRIC

In theory, most fabric is recyclable, although to our knowledge there is no formal fabric recycling industry in Mongolia. However, at the soum level, fabric waste (which mainly comes from cutoffs from professional seamstresses) represents only a small fraction of total waste, so it certainly is not the most critical waste management issue.

For fabric waste, we recommend finding alternative uses locally. For instance, it may be possible to sew old fabric pieces to make livestock covers which herders often use in winter to protect young and weak animals from the cold.

If no such local solution is found to turn fabric waste into something useful and valuable, we can only suggest disposing of it properly in the dumpsite as ultimate waste. However, this solution is not satisfying, so it should be considered temporary until better options come up in the future.

METAL

Broadly speaking, metal is rarely a real waste management issue because everyone is aware of its intrinsic value. Most people in soums keep their scrap metal in case of future necessity, and some even collect as much as possible from everywhere they can find to sell it to scrap merchants.

If scrap metal does end up in your waste management facility, we suggest selling it back to any buyer. Even though selling metal could bring useful income to your waste management system (to cover processing costs of less valuable types of waste), keep in mind that scrap metal collection and trade is traditionally an informal activity carried out by some of the most marginalized people, who find in it their only source of revenue. In that sense, make sure to avoid destroying the precarious livelihood of vulnerable communities.

Besides scrap metal, metal waste is produced essentially in the form of cans, either in aluminium (mainly from drinks) or in iron and steel (mainly for food). Aluminium cans are bought back by most recycling intermediaries, at the price up to 1,800 MNT per kilogram. Iron and steel cans are not purchased as systematically as aluminium cans, although in theory they also are very valuable, and infinitely recyclable.

We recommend collecting both aluminium and iron/steel cans systematically and sorting them separately. Since local recycling is not a very realistic option, we recommend selling back every can for which you find a buyer in urban centers. Since metal is valuable and recyclable, we recommend that you properly store in your waste management facility even the cans which are not sellable at a given time, until a relevant solution is found.

E-WASTE AND BATTERIES

Electronic waste and batteries are produced in small amounts compared to other types of waste, but they raise a major environmental issue as most of them contain very toxic substances which can severely harm the environment when left without proper management. To this day, there are no large-scale e-waste recycling industries in Mongolia, but a significant number of small (more or less formal) actors do buy some e-waste to extract valuable components from them.

If you can find a buyer for part of your e-waste, you should sell whatever can be sold. The rest should be safely stored in your waste management facility until a proper solution emerges in Mongolia. The same logic applies to batteries, which should be stored separately from the rest of e-waste. You may find it impractical to store such waste for an indefinite period of time, but the volume of e-waste and batteries produced at soum level is small enough to do so. In the worst-case scenario where you can't temporarily store this type of waste, it should be disposed of in the same way as other hazardous waste (see below).

ORGANIC WASTE

Organic waste accounts for one of the main types of household waste both in urban and rural areas. In soums, organic waste can make up to one-third of all domestic waste (excluding ash), and this proportion often goes much higher in cities. Organic waste is a major issue in most landfills around the world because its degradation usually produces flammable methane and destabilizes the structure of large landfills.

At the soum level, however, organic waste does not create a big problem as in cities. The first reason is that even unproperly managed and disposed of in dumpsites mixed with other types of waste, it is not an environmental problem as it will biodegrade quickly without producing toxic substances. The usual problems associated with organic waste in urban landfills (including the fact that it attracts pets) is not so dramatic in the relatively small and thin open-air dumpsites of rural areas.

However, it remains essential to manage organic waste properly and separately from other types of waste for several reasons. The first, already mentioned, is that if recyclables are soiled with food leftovers and other kinds of organic waste, they become much harder to recycle (it remains theoretically possible to wash recyclables, but in practice, the extra workload will discourage anyone to recycle). The opposite is also true: if organic matter is polluted by other non-organic waste, it is impossible to use them in different ways. As such, it is extremely important to separate organic waste from all other waste at the source.

Although both vegetable and animal waste are technically organic, the best ways to process each of them are usually quite different. That is why we recommend separating organic waste between these two subcategories. This should be done at source (by waste producers), otherwise, it becomes impossible to separate them afterwards and process each of them correctly.

The usual best way to process green waste (intended as vegetable peels and all other plant-related waste) is composting. Composting is a process that occurs in nature and transforms all living things back to primary organic matter after they die. As such, composting of animal waste is also possible; but as a waste management process, there are many practical constraints, which is why composting is mainly recommended for green waste.

Green waste composting essentially requires some space. The basic principle is to pile green waste and wait for nature to degrade it, although there are some recommendations to follow for the process to go as fast and smoothly as possible. In Mongolia, the cold climate tends to reduce the speed of the composting process, but even unattended, your compost will eventually be ready within a maximum of two years. You can find plenty of guidance and tutorials on the Internet regarding how to manage a proper compost, which could enable completion of the composting process throughout a summer.

In rural Mongolia, a perfectly valid alternative to green waste composting is to simply give the vegetable peels and other green waste to livestock. This way of proceeding is already quite common considering its obvious advantages; it certainly is the best option for all green waste that can be eaten by livestock.

We recommend encouraging all waste producers in your soum (starting with households) to give their green waste to livestock (either their own or those belonging to a neighbour or relative). For the green waste that is not consumed by livestock, waste producers should be encouraged to start a compost in their garden (all of them have enough space outside their homes). Finally, for the green waste that is not managed at waste-producer-level and finds its way to the waste management facility, we recommend starting a compost outside the facility.

For other types of food leftovers and animal waste such as meat, fat and bones, the same animal-feeding approach can be considered, except that leftovers would be given to dogs instead of livestock. A regular household that smartly combines a small compost with animal feeding can

easily manage all of its organic waste at-source without ever having to put anything in the ultimate waste bin.

There are situations, though, where animal waste is produced in large amounts, which makes it impossible to manage everything at the source as mentioned above. It is notably the case during the meat preparation period at the beginning of winter when many animals are slaughtered and lots of fat and bone waste is produced at once. The sudden death of livestock, which technically becomes animal waste as a whole, also requires setting up a proper management process. Today, it is still frequent that dead animals are simply disposed of at the soums' dumpsites along with all other waste, which is very unsafe as it may spread diseases.

There are ways to valorize animal waste such as bones and fat, for instance by turning them into soap or animal food supplements. We recommend investigating and experimenting with possible low-tech value-adding methods adapted to your soum, depending on the amount and type of animal waste to manage, and local market demand for new products. In any case, organising an animal waste collection point at your facility will be necessary to launch specific processes.

Until adequate processes are found and implemented to valorize all animal waste, a proper dedicated disposal area remains necessary. Indeed, disposing of animal waste (especially livestock carcasses) in the main landfill is unsuitable as it will complicate proper management of the landfill and may create human and animal health hazards.

We recommend considering the relevance of creating a dead livestock and animal waste disposal area far from the main landfill. This disposal area should be fenced and its usage should be strictly regulated in the Waste Management Master Plan. This disposal area could be a simple, cheap, natural and effective way to eliminate non-valuable animal waste by letting wild scavenger birds (vultures, crows…) process it.

It is essential to stress that all possible valorization processes and even natural degradation disposal areas should strictly exclude all animal waste (especially livestock carcasses) that is potentially infected with contagious diseases. Such pathogenic animal waste should be separated from the rest and processed in line with basic safety rules.

In rural Mongolia, the most realistic way to process such pathogenous animal waste is to bury it properly. This kind of burial is already a common practice in soums, especially after winter when herders jointly bury all dead animals. Formalising a specific burial area could help systematize the process. Digging and preparing an adequate trench every year before earth freeze would enable proper disposing and burial even during winter if animals die of a contagious disease.

ASH

Usually, in most soums, people already sort their stove ash at source: almost always, for safety reasons, it is not mixed with ultimate waste but put in a dedicated metal bin. In the end, it is usually mixed at the dumpsite when all types of waste are disposed of together, but the fact that it is broadly separated at source is a good practice on which it is possible to build.

Indeed, wood (or livestock dung) ash is a valuable matter which should not be considered as waste. Ash is a good fertilizer for most soils and it has many possible applications, not only in the agriculture sector. For example, wood ash can be used to produce lye that, together with animal fat (or any other oil), can be the base of artisanal soap production.

We recommend that wood (and livestock dung) stove ash be collected separately from all other types of waste (including coal ash) in your waste management facility. You should coordinate with agriculture actors in your soum to find relevant applications, or experiment with any other possible application to use ash as a resource. In any case, keep in mind that wood ash is not a pollutant: in the worst-case scenario where you can't find a useful application, it could perfectly be spread out in the steppe (which it would fertilize) instead of being dumped in your landfill.

In soums, the majority of coal ash comes from the central heating plants rather than individual households, although some do burn a significant amount in winter. For coal ash, applications are probably not as many as for wood ash because of the toxic substances it contains. Nevertheless, research and experimentation can also be conducted to find a proper way to manage and valorize it, as it is reusable especially in the construction sector (for example, to make bricks).

If a more advanced valorization process cannot be implemented, we recommend using coal ash from central heating plant as a cover material in the landfill: if properly disposed of on top of piled up ultimate waste, the texture of coal ash is quite suitable to prevent other types of waste from wind scattering. Waste management staff should thus coordinate with heating plants' staff to properly dispose of their ash every time they need to evacuate it from their plant.

HAZARDOUS WASTE

Hazardous waste management is very complicated at the soum level as there is virtually no proper and realistic way to respect proper management standards. In any case, toxic substances and dangerous waste should not be mixed with other kinds of waste in the landfill. Fortunately, unless some polluting industries are based in your soum (in which case local authorities should force them to respect their environmental protection and waste management obligations), the amount of hazardous waste produced at the soum level remains relatively low.

We recommend properly separating hazardous waste from all other types of waste in your waste management facility. You should coordinate with your aimag center to see if hazardous waste management can be centralised there and/or eliminated through proper channels in dedicated urban facilities. If there is no suitable option, we recommend disposing and burying hazardous waste in a specific part of your local landfill, after sealing it in a waterproof container to avoid leaks.

At the soum level, the most common type of hazardous waste is probably medical waste. Hospital staff is well aware of the danger of this type of waste, and they have protocols in place to process and eliminate their hazardous waste as correctly as possible. However, it is quite common that medical waste is burnt unsafely in metal barrels, which is not a proper way to manage this type of hazardous waste.

We recommend that a proper medical autoclave is provided to your local hospital so that its staff can process medical waste according to relevant safety standards. Such an autoclave is worth app. 5 to 10 million MNT (depending on brands and volume capacity).

ULTIMATE WASTE

As mentioned in Chapter 2, no matter how well you manage to sort and process your soum's "recyclable" waste, you will always have ultimate waste to dispose of in the landfill. To avoid improper disposal by non-trained waste producers, it seems essential that only waste management staff is authorized to enter the landfill and dispose of waste there.

If there is no waste collection service, we recommend that waste producers dispose of their ultimate waste not in the landfill but at the waste management facility along with other types of (recyclable) waste. A dedicated area should be prepared next to the facility. If possible, the waste producers should dispose of their ultimate waste directly in the soum's waste management truck parked next to the facility, to reduce work for the waste management staff. In any case, wind scattering of temporarily disposed waste should be avoided somehow. Regularly, the staff should take the ultimate waste accumulated at the facility and properly dispose of it in the landfill, as previously explained.

If waste producers exceptionally need to dispose of waste directly at the landfill by themselves, they should always be accompanied by trained waste management staff to avoid improper disposal and other problems.

4. RAISE AWARENESS AND ADVOCATE

THE MOTIVATIONAL PREREQUISITE

It is a common belief that the lack of financial resources is the main obstacle to proper waste management. However, an important lesson learnt from Ecosoum's experience is that, although adequate funding is important, even more essential factor lies in the motivation and active involvement of *all* local stakeholders – from soum authorities to sedentary and nomadic households, from public institutions to private businesses.

Soum administration can never manage waste properly if local waste producers (households, institutions and businesses) are not willing to participate actively in the waste management system. Likewise, grassroots organizations and local zero-waste activists cannot set up an entire waste management system on their own if local administration is not actively involved. The chain of relevant stakeholders must be complete for an effective and efficient waste management system to be set up at the soum level.

Although this motivational factor may seem trivial to some observers compared to the lack of financial resources, the reality is that waste can be managed decently with very little funding if all stakeholders are truly concerned and involved. The opposite – significant funding but low motivation – is unfortunately not true. When it comes to waste management, resourcefulness and ingenuity can easily overcome financial constraints. However, awareness-raising activities are usually insufficient to initiate strong involvement from scratch if there is not enough comprehension and motivation already tangible beforehand.

That being said, the paramount importance of this motivational prerequisite should not discourage you from managing waste even if only a small part of the population and other relevant stakeholders are concerned about the issue. Local authorities are legally obliged to set up a waste management system in their soum no matter what, and activists should never give up fighting for their cause. But, based on our experience, it seems essential to understand the paramount importance of the motivational factor, because leading stakeholders will most likely face a lot of discouraging inertia – even if no one intentionally opposes their actions. That is why we emphasize this point so much: finding ways to actively involve all parties from the beginning is the undeniable key to success.

The first thing to do, as soon as the will to improve waste management emerges from one or several actors, is to immediately organize multiple public meetings involving local administration and as many citizens as possible, to discuss the issue of waste management in the soum and hear all parties' opinion. The goal of these meetings (which can be seen as part of your baseline study investigations) should be at the same time to evaluate the level of concern and motivation of all local actors and to start building synergetic involvement of all parties.

There are two main ways to create and enhance the motivational prerequisite factor. The first one is to provide incentives to increase involvement and participation at one or several key steps of the waste management chain. As previously explained, we do not recommend providing financial incentives because, in our opinion, the risks and counterproductive effects exceed the benefits.

However, providing other forms of incentives can still be relevant and beneficial if they are well thought out and adapted to your local context. For example, if you recycle some plastic locally, you could offer recycled items as a reward to the people who sort and manage their waste the best; you can also organize challenges regarding waste management good practices and offer rewards to the winners; you can provide waste management equipment to waste producers to kick-start their participation in at-source waste sorting and other aspects of soum-level waste management; and so on.

There are many possible ways to plan and offer non-monetary incentives to increase motivation and involvement, but not all are adapted to each context. We recommend assessing the most suited incentives in your local context and discussing the possible ideas with relevant stakeholders to make sure that the chosen incentive will indeed be effective and beneficial without bringing counterproductive negative effects.

RAISE AWARENESS, TRAIN AND FOLLOW-UP ON ALL LOCAL WASTE PRODUCERS

The second main way to enhance the motivation and involvement of relevant stakeholders is to raise awareness about the issue of waste management. This awareness-raising work – which we intend here in a broad sense as information sharing, adequate training, follow-up and so on – is even more important than the provision of incentives, although the two approaches do not oppose each other (on the contrary, they are even more effective if properly combined).

If you carefully conducted your baseline study, you should have highlighted the main knowledge and awareness gaps to be filled among each category of waste producers. The proper assessment of everyone's level of concern and understanding regarding waste is essential to define what topics to address in priority with each group of stakeholders, which is why it should not be neglected. Indeed, it is important to customize the content of your trainings and information-sharing activities to each target, so that each of them benefits from your actions and concrete improvements can be quickly observed.

We recommend that you make the effort to look at the waste management issue from everyone's perspective, to perfectly grasp the level of understanding and motivation of each group of stakeholders. Only on that condition will you be able to define relevant and adequate awareness-raising activities.

Overall, you will essentially have to address two main types of topics, which we can call "practical" and "theoretical". The practical topics include everything that there is to know, in concrete terms, to properly sort and manage waste at the local level. Most people have a broad idea of what sorting waste means, but when the time comes to sort waste, many of them face doubt and misunderstanding, which leads them to sort improperly.

Depending on what you planned in your waste management scheme (required level of at-source sorting, collection service or not, etc.), it is thus essential to start by producing short guidebooks

and/or tutorial videos to provide waste producers with very detailed and visual information on how they should handle their waste at source. In these supporting materials, you need to explain and demonstrate thoroughly what you expect people to do.

We recommend that, if possible, you produce guidance material specific to each group of waste producers, to avoid confusion and misunderstandings. However, you should focus, at least as a first step, on precise guidance to households, because they are very numerous and it will be virtually impossible to visit each of them to make sure they correctly understand and apply your recommendations.

In Khishig-Undur, we produced a practical guidebook[12] with specific recommendations perfectly adapted to our new waste management scheme. This guidebook was distributed (and explained) to each household when they received a waste sorting bin. We also edited a 10-minutes-long video[13] in which we demonstrated how we sort waste at home so that viewers can picture what is expected of them and follow our example.

You can use our guidebook and video to raise awareness and train the households in your soum. However, it would be better if you can produce your material because you could perfectly adapt your recommendations to your waste management scheme.

In addition to these guidebook and video, which are intended to be mainly for personal use at home, you should prepare a presentation for group meetings. The easiest way is usually to prepare a PowerPoint document[14] with the same (or slightly adapted) information as in the printed guidebook so that you can screen it and explain everything orally in person. This kind of group meeting is important because it brings the opportunity to answer questions and open discussions with a group of waste producers who have the same kinds of difficulties.

You can organize public meetings open to all citizens to answer the questions of the general population, but the meetings are also particularly essential in public institutions and other organizations with many employees because they allow discussing at the same time at-home sorting and at-work sorting. Group meetings in institutions are essential so that all employees have the same level of understanding even if they have different positions and perspectives. For example, teachers and cleaning staff in school may not coordinate properly if you don't actively organize discussions between the two groups of people.

[12] Our *How to sort waste?* guidebook (01/2021) is available on Ecosoum's website.

[13] www.youtube.com/watch?v=2ipggSVA7b0&t=1s

[14] The PowerPoint presentation of our *How to sort your waste* training (09/2021) is available on Ecosoum's website.

You must organize frequent follow-up among all the categories of waste producers. After your first training, it is unrealistic to expect that all of them will sort and manage their waste properly. Many mistakes will be made for a long time, and you will surely face a lot of inertia and drawbacks. The only way to ensure a progressive implementation of all your recommendations is to organize repetitive formal and informal follow-up with everyone. We recommend visiting waste producers weekly or monthly to make sure that they are all following your guidelines, to point the mistakes, and to repeat your waste management requirements until all waste producers perfectly apply the guidelines.

As previously mentioned, in addition to these "practical" trainings and awareness-raising activities, you will also need to carry out more "theoretical" ones, because although most people are aware that waste is a serious issue, their knowledge is usually vague and abstract. People need to understand the big picture and the reasons why you ask them to sort and manage their waste in a certain way. Only with a good level of understanding and awareness all waste producers will actively and willingly integrate good waste management practices.

These theoretical trainings should include various kinds of information and answer questions people may or should ask themselves, such as: What is waste? Why do we need to worry about waste? How does recycling work? What are the advantages and limits of recycling? How can we reach zero waste? What is the 3R rule?

We recommend that you produce at least one "theoretical" PowerPoint presentation (in addition to the "practical one") based on the knowledge gap you identified in your baseline study. You should organize at least one theoretical awareness-raising event for all waste producers in your soum, to make sure everyone fully understands what is at stake. The previously mentioned follow-up activities mainly concern the practical issues, but following up on broader "theoretical" topics can also be useful once in a while.

The theoretical training[15] we produced for our awareness-raising activities in Khishig-Undur is also applicable in your soum, so you can use it if you do not produce your own training materials. We also dubbed in Mongolian two very informative videos about plastic and about consumption and waste production, which are available on the awareness-raising page[16] of Ecosoum's website. Also, this page includes all the information, both practical and theoretical, that we consider important for all local waste producers.

Overall, this combination of the website page, PowerPoint training, printed guidebooks, tutorial videos and informative short films constitutes an extensive package of awareness-raising and training material and tools that includes all the relevant and coherent information to be broadly shared in the soum. You can directly use or adapt these materials for your awareness-raising activities.

[15] The PowerPoint presentation of our *Let's Talk about waste* training (09/2021), as well as a supporting document with many information to share during the training, are available on Ecosoum's website.

[16] www.ecosoum.org/hog

In addition to the trainings and follow-up activities you will carry out among all groups of waste producers, we recommend that you identify a few motivated people and train them more extensively than others so that they can become trainers themselves. This "training of trainers" approach is very important if you want to spread your recommendations rapidly and keep the knowledge sustainable. Ideally, you should have "trainers" among each group of waste producers and each institution. It is especially important that at least a few teachers stay active at school to raise awareness among children of all ages.

In addition to all the information-sharing activities and training sessions previously explained, it can also be very helpful to organize other kinds of awareness-raising events to mobilize and involve people. For instance, you can organize community waste picking campaigns or various kinds of challenges and rallies. You can also plan "zero-waste" events, for example during Naadam (to try and reduce the amount of waste produced during a specific event to the minimum). The goal of these types of events would not be to share specific information (unlike trainings) but to increase people's motivation and concern about waste-related issues. Whatever you do, try to be as interactive and thrilling as possible.

ADVOCATE AND INCLUDE YOUR LOCAL ACTIONS IN A BROADER FIGHT

Finally, it is essential to understand the fact that no matter how well you plan your waste management scheme, and no matter how perfectly it is implemented by all local stakeholders, *there is currently no way you can actually manage your soum's waste in a truly satisfying manner*.

The reason is that today, our societies produce too much waste in the first place, and a large part of this waste is constituted of items and substances that no one knows how to manage properly, especially from an environmental standpoint. This observation is true not only in Mongolia but also, to varying degrees, all over the world, which is why our entire planet is facing a dramatic waste crisis.

In Chapter 3, we saw that, although there currently are effectively implementable solutions for some categories of "recyclable waste", there also are many types of waste for which there is no actual solution (brown PET bottles, various mixed plastics, most glass, some metal cans, Tetra Paks, batteries and others). The reason we advised to properly sort and store all these non-recycled categories of waste is precisely that it is essential to fight for solutions to quickly emerge.

We thus recommend that you produce extensive data about the categories of waste for which you cannot find a suitable management solution. The massive production of this essential data is the key to exposing the blind spots of waste management in Mongolia and putting pressure on the national-level responsible parties.

In our opinion, the said responsible parties are essentially the packaging industry and the companies such as the food and beverage industries that use and produce this overwhelming packaging waste. This statement is not only based on historical facts from all over the world, it is

also consistent with what is observed at the soum level: a tremendous part of a soum's waste is constituted of plastic and glass packaging from drinks and food products.

This situation shows that it is necessary to bring the concerned industries back to the center of the waste management issue and to force them to adapt their practices to reduce the amount of waste produced in the first place. Only under this condition will it be possible to manage waste properly at the soum level (and at all other levels).

In May 2021, we produced a carefully argued and sourced report entitled "*Zero Waste and Circular Economy: The Way Forward*"[17], as well as an interview video[18] summarizing the most important points of the report. We believe this report to provide essential perspective and information on the global waste issue and the responsibilities of specific stakeholders. Taking this information into account when you reflect on waste management is extremely important, and we advise using the interview video as a key awareness-raising tool in your soum.

We recommend that you carefully read our "Zero Waste and Circular Economy" report and make sure that all your advocacy, awareness-raising and practical waste management actions take the key positions and recommendations into account.

More specifically, the key positions and recommendations with which all your actions should be consistent can be summarized as follows:

- Keep all waste management considerations in the framework of the "big picture" of our societal economic model to truly understand the core challenges and waste management issues;
- Fight for the immediate and strict ban of disposable products (both single-use and short lifespan items);
- Be transparent about the limits and drawbacks of recycling to avoid counter-productive disincentive effects on waste reduction/reusing;
- Condemn and forbid misleading use of the term "recyclable" when recyclability is only theoretical and no operational recycling processes are implemented in Mongolia;
- Push all industries to systematically switch to reusable packaging and organise reusable packaging take-back;
- When products cannot be made reusable:
    - promote priority use of recyclable materials;
    - ban non-recyclable materials when a recyclable alternative exists;
    - condemn designs that make effective recycling impossible, even when theoretically recyclable materials are used;
- Push packaging industry to:

[17] Our *Zero Waste and Circular Economy: The Way Forward* report (05/2021) is available on Ecosoum's website.

[18] https://youtu.be/LBASY5ZHHfY

  - reduce the range and number of materials they use, especially in terms of plastic types;
  - stop making multi-material packaging that can't be effectively recycled;
  - standardize packaging by type of product for all companies and brands, both for reusable and recyclable packaging;

- Encourage people to adapt their consumers' habits to reduce the waste generation in the first place, and/or to favor reusable items and packaging;
- Call for extensive waste sorting not just by households (who produce less than 10% of all waste) but by all waste producers, especially industries (which produce most of our trash);
- Use extensive sorting not only for direct recycling but also to produce data to better understand what non-recycled products and brands currently make up most Mongolian waste - and subsequently advocate for adequate measures to be taken.

No soum-level actor alone is powerful enough to put enough pressure on incriminated parties and make them change their practices. That is why we recommend that you actively connect your efforts with other waste management actors and zero-waste activists such as Ecosoum. Coordination of all soum-level stakeholders is essential to combine our data and become strong enough to make soum-level voices heard. We should also find ways to combine our efforts with other zero-waste actors, at the national level or even abroad, to become stronger and call for necessary changes on a systemic global scale.

SUMMARY CONCLUSION

Based on Ecosoum's experience and lessons learnt, this guidebook aimed to provide step-by-step recommendations for soum-level actors to organize effective waste management systems that are applicable in their local context and consistent with broader waste-related issues. In summary, the main steps to follow are:

1. To produce a baseline study that precisely evaluates the current situation in the soum and perfectly summarizes ins and outs of local waste issues.
2. To design, based on the findings of the baseline study, a relevant and applicable waste management scheme for the soum, which should present the exact way to handle all types of waste from source to final treatment.
3. To adequately manage and process each category of waste in the soum's waste management facility according to the predefined scheme to reduce the amount of ultimate waste to dispose of in the local landfill to the very minimum.
4. To carry out awareness-raising and training activities among local waste producers to ongoingly strengthen actual implementation of the local waste management scheme and processes, while broadly advocating for systemic changes that are necessary to tend towards a zero-waste society.

Since all soums are different and require specifically adapted waste management systems, this guidebook does not aim to bring definitive answers to all questions that may arise when following the above-mentioned steps. It is perfectly possible that some recommendations are irrelevant or inapplicable in some soums, or that better solutions than the ones suggested here can be identified. Nevertheless, this guidebook is intended to highlight the main aspects of soum-level waste management issues and provide guidance and recommendations on how to identify and overcome the main challenges and difficulties that most waste management actors will face.